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SYPHILITIC ARTHRITIS*

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As our methods of examination are improving and we are therefore finding more cases of arthritis due to definite causes, we cannot fail to be impressed with the fact that syphilis is the direct cause of many cases of single and multiple arthritis.

Syphilitic arthritis was known to the ancients, and was described in the Middle Ages by Maetyr and Feyrus. According to some writers, this knowledge seems to have been lost.

In 1817, Sir James Russell recognized syphilis as a cause of arthritis. Many papers on syphilitic arthritis are found in the literature, but probably because the text books say little about the disease, the writer has found in discussion with his confreres that the definite diagnosis is not often made except in the case of Charcot joints or parasyphilitic arthropathy.

Several writers mention the fact that a great deal of confusion in diagnosis exists. Many cases of arthritis due to some other infection are called syphilitic merely because they occur in syphilitic patients.

When we speak of syphilitic arthritis we must confine ourselves to a discussion of these cases actually caused by syphilis; those cases which are cured, or at least helped, by antisyphilitic medication.

Syphilitic patients often have arthritis from another bacteriological cause. My records do not show a positive blood or spinal fluid Wassermann reaction in more than 50 per cent of the cases of syphilitic arthritis diagnosed by skiagraphic findings in patients who improve rapidly under antisyphilitic treatment. Phillips says that one would expect the per cent of error to fall in the diagnosis of syphilitic arthritis with the use of the Wassermann test. Errors are now more frequent, however, because undue credence is being given to the Wassermann reaction.

Nichols states that 50 per cent of cases of latent bone syphilis give negative Wassermanns and he feels that we should rely on the x-ray findings rather than on anything else. This has always been my contention and I feel that the skiagraphic picture of bone lues is pathognomonic.

Campbell, however, found that in 100 cases of bone and joint syphilis 88 had distinctly positive Wassermann reactions and 12 were negative.

The skiagraphic findings are definite periostitis, new bone laid down parallel to the shaft; and in some cases the Codman blister is seen. A cortical thickening is often observed, this thickening being at the expense of the medullary portion of the bone. A lace work type of periostitis is also seen. Definite small punched out areas are quite common on the surface of bones entering into joints, for instance, the tuberosities of the tibia. Localized sharply pointed hypertrophic changes are frequently seen.

The long bones, especially the tibia and fibula, and quite frequently the femur, show these periosteal changes extremely well. We also see the osteomyelitis or degenerative changes. The flat bones rarely show anything but osteoporosis.

Sclerosing osteomyelitis of Garre must be ruled out in making our diagnosis. I have recently seen a case of this latter disease which was diagnosed as syphilis by a very careful surgeon. While I feel very strongly that skiagraphs of the long bones should be made in all suspected cases, and that when the above mentioned changes are found, the diagnosis of syphilis should be made, I also realize that syphilitic arthritis may exist without demonstrable bone changes.

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twenty-Fourth Annual Meeting, Louisville, Kentucky, November 11-14, 1930.

Campbell says that there is rarely an occasion to differentiate syphilis and infectious osteomyelitis, except in the hands of a novice. The picture may be complicated when secondary infection has occurred as a result of pernicious operative interference or spontaneous evacuation of pus with discharging sinus, a true infectious osteomyelitis engrafted upon syphilitic osteitis.

Writers differ very much as to just how common syphilitic arthritis is. Parrot says that only 5 per cent of congenitally syphilitic babies have arthritis. Founier's figures are 35 per cent, while Schuller states that 70 per cent of all arthritis in children is syphilitic.

All authors agree that arthritis occurs in all stages of syphilis, congenital and acquired. In our clinic we see it mostly in adults and in the tertiary stage.

In making a diagnosis, the family history, past history and marital history must be carefully considered. The importance of the latter is, I think, very well brought out in one of the case histories here reported. We frequently see cases of painless joint swelling, especially in the knees, that have baffled the patients' previous consultants. These cases are often called rheumatism and treated with the salicylates, without results.

This type is seen quite frequently in young people. It is caused by congenital syphilis and is often mistaken for tuberculosis, especially if there is a history of trauma. It is not so painful as tuberculosis. The pain, if there is any, is usually at night. These cases react rapidly to antisyphilitic treatment.

In differentiating these cases from tuberculosis, we find that in syphilitic arthritis there is little muscular wasting and the movements are restricted very slightly, if at all. Therefore these cases get about surprisingly well.

In the secondary stage of acquired syphilis the same conditions are found, and in all cases of hydrarthrosis, or painful joints, for which we cannot find a cause, syphilis must be suspected.

D'Arcy Powers' classification of syphilitic arthritis is the most comprehensive I have found.

(1) Congenital syphilis
Suppurative arthritis
Hydrarthrosis
Symmetrical serous synovitis or Clutton's joints
Gummatous synovitis
Chondro-arthritis, ulcerating, or Van Gies' joints

(2) Secondary syphilis
Arthralgia
Synovitis (intermittent, chronic)

(3) Tertiary syphilis
Gummatous synovitis
Chondro-arthritis, ulcerating, or Virchow's joints
Tabetic, sclerosing, or Charcot's joints

The types mentioned are by no means found only in the stages where they are tabulated in this classification. Most of our cases are, as nearly as we can ascertain, in the tertiary stage, and we see cases of arthralgia and synovitis very frequently in this stage.

I recently saw a patient whom I had not seen for several months, but had treated previously for rigid flat foot, with complete relief. She came complaining of pain in her right shoulder; at first the pain was slight, but it rapidly increased in severity until all active and passive motions of her shoulder were practically impossible on account of pain. She was given a complete medical examination. Blood Wassermann and skiagraphs were negative. Physiotherapy gave her no relief. At last in desperation I gave her mixed treatment. To my surprise she began to improve and in a few weeks was symptomatically well. She continued to take medicine for several months. The last time I saw her she had been without medicine for about three months and came asking for more. You may say this is purely empirical. It is, but in the final analysis our patients come to us for relief.

A classical paper by Alan H. Todd on syphilitic arthritis contains several aphorisms:

"Bilateral painless hydrops of the knees in children is due to syphilis.

"Never diagnose rheumatism in any form until syphilis has been excluded as a possibility in the diagnosis.

"Never diagnose tuberculosis or any other form of arthritis until you have excluded syphilis.

"Monarticular arthritis of a deforming type at any age, with or without pyrexia, may be due to syphilis."

There seems to be no doubt that many cases of syphilitic arthritis go undiagnosed for a long time simply because, in the first place, the consultant does not suspect syphilis as a cause, and in taking the patient's history he does not go into the past history carefully enough. In the second place he puts too much confidence on a negative blood Wassermann report. It is much better always to be on the lookout for syphilitic arthritis than to miss one case, because the earlier treatment is begun, the better are the results. We all make these mistakes and it is very humiliating to meet a former patient whose case we were unable to diagnose, who has been successfully treated elsewhere.

The following cases represent a fair average. The third case, Mr. V.'s, I have reported in some detail to show the importance of a very full family and marital history.

Case 1.—Miss B., age 16, complained of swelling and pain in the ankles, knees and elbows for the previous 15 months.

The family history was negative, as was the past history.

The patient had marked thickening of the capsules of both knees with swelling and localized pain on motion over the outer aspect of the right knee. The history of the case was that of polyarticular infectious arthritis, at the time apparently in a chronic state. The circumference of the right knee was 14.5 inches, the left knee 13 inches. Swelling in the right knee was due to synovitis. The patient said that about a year previously the left knee was swollen. Limitation in extension of the left elbow was 20°. There was slight limitation in pronation.

Case 1

Skiagraph Report.—The patella ligament is, practically speaking, wiped out, as in the triangular space behind this, while around the articular margin of the joint, small punched out areas, as though bitten out with a forcep, can be seen. A fairly extensive change within the knee joint, the biting out of the structures along the articular margin with normal remaining bones, point very strongly toward lues. While this department does not wish to defend this diagnosis of lues too strongly, it is considered most probable. No other lesions can be made out (Dr. Henderson).

Congenital syphilitic arthritis was diagnosed and mixed treatment given.

The patient made a steady improvement. She has not been seen since July, 1930, when she was symptomatically well.

Case 2.—A. S., age 22, gave a negative family and past history.

Two weeks previously the patient began to have pain in the elbow joints, wrist, knee and ankle joints. The pain had been constant since onset and was worse at night. The joints were very stiff in the morning when the patient got up, causing difficulty in movement of the hands and in walking.

There was pain and limitation of movement in both elbows, ankles, knees and shoulder joints. There was no history suggestive of venereal disease. Some dental work was noted. The Wassermann was three plus.

Mixed treatment was given and contrast baths were ordered.

Syphilitic arthritis was diagnosed.

The patient said she felt much better and would continue with mixed treatment. She was last seen May 15, 1930, symptomatically well.

Case 3.—Mr. V., age 32, gave a negative family and past history.

This patient was referred to me by Dr. J. Rives, with the diagnosis of chronic right sacroiliac and spinal arthritis. He was admitted to Touro September 17, 1929.

About three weeks before admission the patient noticed a rather severe pain over the low back and right side. This pain radiated down to the knee. He was working at the time and continued to work in spite of the pain. At that time he had sacroiliac strapping, from which he experienced some relief, but as soon as the strapping was removed, the pain returned. There was no history of injury.

Motions of the right hip were limited in flexion and abduction and to a slight extent in rotation. Raising the extended right leg caused pain in the low back. There were no tender points. The patient also complained of slight indefinite joint pains.

Working on the basis that the patient was suffering from infectious arthritis, we at first tried to find the cause of this arthritis, as the following reports show:

X-Rays of Teeth.—Two infected roots were removed. These roots constituted a focus of infection (Dr. Hava).

Prostate.—The prostate was a trifle congested, but drained well. The secretion contained a small amount of pus. Probably the prostate was not associated with the arthritis. However, we suggested massage twice a week as a therapeutic test. The prostate was treated (Dr. Reed).

Sinuses and Tonsils.—Very large diseased tonsils were removed. A thickened deviated nasal septum obstructed the view of the sinuses. The ears were negative.

X-Ray Entire Lumbar Spine and Sacroiliac Joints.—There was no visible evidence of periosteal or bone change at any point within the spine, hips or sacroiliac joints (Dr. Henderson).

X-Ray Nasal Sinuses.—There was a cloudiness of both sphenoid sinuses and both ethmoid sinuses were slightly cloudy. The remainder of the sinuses were quite clear. The middle turbinates of both sides were removed (Dr. McComisky).

The blood Wassermann and spinal Wassermann were negative.

In spite of our ruling out or treating all infectious foci while the patient remained in the hospital five weeks in the fall of 1929, we were unable to do more than partially relieve him, which was apparently accomplished by rest and good food. The patient was discharged October 10, 1929, and readmitted October 25, his history being that during the week he was at home he began to feel worse. Knowing how care-

fully we had been over him for foci of infection, my intern asked our social service department for a very detailed social service history. This history follows:

The French Hospital reports that the patient was admitted on October 16, 1927, and discharged on December 31. The diagnosis was acute gonococcal urethritis, peri-urethral abscess, and acute arthritis of both knees, both wrists and both ankles.

The patient was known to the Associated Catholic Charities from December 9, 1927, until February 1, 1928. The man said that he had been suffering with kidney trouble and was employed only on part time. The family consisted of a wife and four children.

The wife had had three miscarriages and one stillborn baby (nine months) before she had her four living children. Bernard and Felicie both had hemorrhages when they were born and had to be treated. The wife claimed that she had spells at her menstrual periods until after she was married. After her first two children were born she began to take "the needles" at the Child's Welfare Clinic and had been feeling well ever since. She had no trouble with her two younger children.

The patient was born on October 4, 1905, following a normal delivery. He was well as a child. Measles was the only childhood disease that he ever had. He went through the grade school without any trouble and was ready for high school when he stopped to go to work. His parents were both living and well and four sisters were also in good health.

In an interview with the patient on the ward, the social service worker explained that the physician wished her to visit his home to learn as much as possible about his present illness and also to see how his family was getting along. The patient suggested that the worker also call to see his mother, as he felt that she could give more information than his wife.

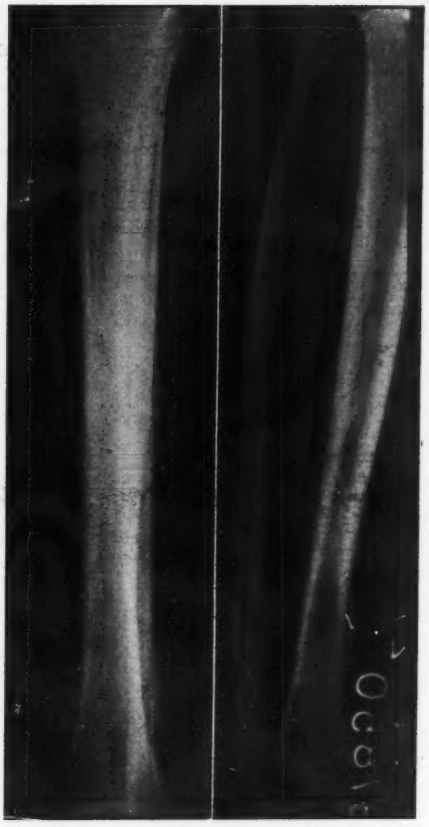
The worker visited the patient's home and interviewed his wife. Both the wife and her sister impressed the worker as very low mental types. The wife admitted that she was still nursing her three-year-old baby though she had no milk, and that the boy, aged four, insisted upon drinking everything out of a bottle. The wife felt no hesitancy in telling the worker all that she knew about her husband's condition and her own medical history.

The patient's own mother was a well preserved, intelligent woman of 55 years of age. She seemed distressed over the patient's condition and said that she was glad the worker had come to see her, as she had been wanting to let the doctors know for some time that she believed her son's condition was due to a disease he caught from his wife. She said that all her children were healthy and that she and her husband had never been sick. She suggested that the worker call to see the patient's family physician.

The family physician stated that he had never treated the patient, but remembered his wife perfectly, that she had syphilis and that her first two babies were luetic. He said that he had never seen babies in a worse condition.

Skiagraph Report on Patient.—There is considerable alteration in the cortex of the bone, particularly in the fibula. The changes here are considered to be those of lues (Henderson).

The patient was immediately placed on mixed treatment and in a very short time started to improve and



Case 3

continued to improve steadily so that on February 7, 1930, he was discharged as symptomatically cured and ready for work.

October 28, 1930, he reported that he was well and had been steadily at work since his discharge.

This case is reported in detail in order to bring out the fact that even though we had thought of syphilis as a cause of the chronic multiple arthritis, because this patient absolutely denied venereal infection, the blood and spinal fluid Wassermann were negative, and there were no other signs or symptoms of syphilis, we allowed ourselves to forget the possibility of this disease as a cause.

Case 4.—S. G., age 40, complained of a painful right knee.

Her parents had died when the patient was very young. The cause of their death was unknown. There were no illnesses nor accidents. Six or seven years previously the patient had come to the skin clinic for treatment of an eruption of the feet.

About six months previously the patient began to suffer with stiffness and swelling in the right knee.

About two weeks before the trouble became acute and she had to stop work. She said the "bone aches." The pain was very severe when the knee was bent, and relieved only when it was extended.

The circumference of the right knee was 19.5 inches, of the left knee 19 inches. Motion of the right knee from an angle of 80 to 180° was accompanied by pain, very slight over the inner aspect of the knee joint. There was no grating or crepitation on motion.

Case 4

Skiagraph Report.—At this time there is no visible evidence of periosteal or bone change to be made out at any point in or about the knee joint. However, the shaft of the long bones, particularly below the knee, gives evidence of a very marked increase in the thickness of the cortex with new bone laid down parallel to the shaft, evidence of lues (Dr. Henderson).

The patient was given mixed treatment.

July 23, 1929, the patient felt well. She continued with the mixed treatment.

August 13, she stated that the knee was well. She complained of pain and swelling in the ankles and continued with mixed treatment.

August 27, there was swelling in both ankles and relaxation of the anterior arches. Spiral strapping was used. She was to continue with mixed treatment.

September 3, the feet were improved. They were restrapped. She continued with mixed treatment.

September 10, she was improved. Four-inch Ace bandages were employed. She continued with mixed treatment.

September 24, she removed the bandages. She felt well. She continued with mixed treatment.

November 5, she had been feeling well until the preceding week, when her right knee began to bother her. Nothing could be seen to be wrong with it. The patient persistently refused to wear her bandage or to continue with mixed treatment.

Case 5.—Mr. M., age 51, had been having trouble with both knees for some time. He complained more of the right than the left.

The condition in the patient's right knee had been aggravated by several minor injuries. There was motion of both knees from 90 to 170° with slight grating.

Case 5

Skiagraph Report.—There is scarcely any differentiation of the cortex and the medulla of the femur, but there is a very marked irregularity along the posterior aspect of the femur. Evidences of bone change are visible about the joint and in the tibia, so that in the tibia and fibula both evidences of well defined lues can be observed. This appears to be a luetic joint (Dr. Henderson).

The diagnosis was syphilitic arthritis.

April 17, 1930, mixed treatment was given.

April 25, the patient was improved. He continued with mixed treatment.

He improved rapidly and has not been seen since April 25, when he was symptomatically well.

Case 6.—Mr. L., age 75, complained of pain in both knees and difficulty in walking. His knees gave way while walking.

The family history was negative.

In 1872, when the patient first came to this country, he had malarial fever for two successive years. He had had occasional attacks of lumbago. There had been no accidents. His general health had always been good.

About three weeks before my examination he began to have pain and stiffness in both legs from the knee down, worse in the right leg. He had difficulty in walking.

There was free movement of the right knee from 180 to 90°. Attempted passive flexion past this point

caused excruciating pain. Motion in the left knee was free and painless. All the teeth were missing and there was evidence of hypertrophic arthritis.

Case 6

Skiagraph Report.—A very extensive calcification of the popliteal vessels can be observed. This is associated with a well defined hypertrophic arthritis about the knee joint, particularly the patella, as well as a marked villous arthritis within the knee joint. Certain periosteal and bone changes visible upon both the tibia and fibula are considered to point rather definitely toward lues. This, associated with the villous arthritis and calcified vessels, almost certainly points toward lues (Dr. Henderson).

Syphilitic arthritis was diagnosed and the patient put on mixed treatment March 11, 1930.

March 18, he felt much better. He was told to continue with mixed treatment.

April 8, he felt pain after walking, but when he was quiet had no pain. He was urged not to walk much, to wear a 6-inch Ace bandage to knee, and continue with mixed treatment.

May 20, he was feeling better and was told to continue with contrast baths and mixed treatment.

June 17, he returned for mixed treatment. The knee was much better. He made a steady improvement and has not been seen since this date.

CONCLUSIONS

(1) Syphilitic arthritis is much more common than is generally believed.

(2) Always suspect syphilis in all cases of arthritis that cannot be definitely diagnosed.

(3) Do not place too much credence on a negative Wassermann.

(4) Have skiagraphs of tibia and fibula made in suspected cases.

(5) Give antisyphilitic treatment as a therapeutic test in doubtful cases.

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DISCUSSION (*Abstract*)

Dr. O. R. Miller, Louisville, Ky.—Patients, especially children, with chronic arthritis sometimes prove to be the most difficult cases that I encounter. Frequently, in patients with an obstinate chronic synovitis, we are able to find no definite focus of infection, and antisyphilitic treatment seems not to be beneficial. Perhaps if specific treatment were instituted in these cases and persisted in over a long period of time, a great many more patients would be benefited than have been heretofore.

I should like to ask specifically what is meant by mixed treatment. We have used potassium iodide in combination with bichloride of mercury and arsenic by mouth and have used very little arsphenamine.

Dr. Philip S. Hench, Rochester, Minn.—In Rochester we feel that syphilitic arthritis is very rare. In Stokes' series, when syphilitic joint involvement did occur, it was always in late lues. A patient may, of course, have an infectious arthritis unrelated to his positive Wassermann. Even if the arthritis is improved coincidentally with specific treatment, one is inclined to conjecture whether the improvement was not from a nonspecific effect.

Forkner has recently published a survey of studies on the synovial fluid that is of interest in this regard. He feels that a positive Wassermann reaction of the joint fluid associated with a negative reaction of the blood is strong evidence in favor of syphilitic arthritis. A positive Wassermann of the joint fluid with a positive reaction of the blood may or may not be indica-

tive of syphilitic arthritis. A positive Wassermann reaction of the blood associated with a negative reaction of the synovial fluid probably indicates protection against the ultimate development of syphilitic joint disease.

May I ask Dr. Hatch whether the Wassermann reactions were determined on the synovial fluid in these cases? I should like also to hear about the specific and nonspecific treatment of his cases.

Dr. Willis C. Campbell, Memphis, Tenn.—The fact that there is a joint lesion and a positive Wassermann does not prove the lesion to be due to syphilis. In August, 1925, I reported 33 cases in which there was evident disease in the joints and a positive Wassermann. Seventeen of these had intensive antisyphilitic treatment without the slightest beneficial effect upon the joint disease. I differ with Dr. Hatch regarding the value of the Wassermann reaction in bone and joint syphilis.

In 1925, I reported 100 cases of bone and joint syphilis in which the Wassermann was positive in 88. At present with the gradual improvement in technic this test is positive in possibly 95 per cent of those with syphilitic joints. In a few instances I have known a joint lesion with a negative Wassermann to respond to therapeutic measures. As Dr. Hatch states, syphilis of joints is by far more common than is generally known, but there are certain roentgenographic and clinical manifestations by which a syphilitic lesion is suggested.

Dr. E. Bennette Henson, Charleston, W. Va.—In a paper on this subject about ten years ago I stated that I had never seen a case of syphilis of the joints in which adequate mercury treatment had been given, but I had seen quite a number that had had arsphenamine treatment. One patient who, I recall, had received 32 doses of neoarsphenamine, returned five years later with a definite syphilitic joint.

Dr. Hatch (closing).—I use the old fashioned mixed treatments regularly and arsphenamine but rarely, because I am convinced that arsphenamine is not so efficacious in tertiary or secondary syphilis as many people seem to think it is. I agree with the last speaker. The old fashioned mixed treatment consists of a good dose of bichloride and a large dose of potassium iodide, up to 50 or 60 grains, three times a day.

I have had very few cases in which I found enough fluid to get a joint fluid Wassermann test. Todd advises strongly the testing of the joint fluid as an aid in diagnosis.

In one of the cases reported I went into great detail to show that we had no reason to suspect syphilis. All examinations were negative for syphilitic infection. But as soon as we had a lead to syphilis from the social service history and had skiagraphs of the long bones, the diagnosis was plain.

It is better to give many patients who do not need it the therapeutic test of syphilitic treatment than to miss one case which needs it.

LINITIS PLASTICA*

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The term linitis plastica was first used by Branton in 1854, but it was definitely reserved by him for what he considered the benign form. He, at that time, excluded sclerosing carcinoma from the title. Couveilleir, in 1835, had expounded similar views on what was considered the same lesion.

Since that time there has been an increasing amount of literature on the subject, considered under many and various names and assigned to as many and as varied etiological factors. A mere repetition of the articles written with their conclusions would constitute a formidable article in itself.

Fenwick spoke of the condition as primary atrophy; Von Sury as chronic passive hyperemia, due to cardiac insufficiency; Huchard held it to be arteriosclerotic; Poucet and Lyons considered it tuberculous; Bouveret as lymphatic obstruction; Willis as primary sclerosis of the submucosa; Garrett and Bard as secondary sclerosis following infiltrating epithelioma; Thacker as epithelioma starting in the mucous membrane and infiltrating the gastric walls, causing irritative hyperplasia; Hausemann as pure endothelioma; Delabet as diffuse cancer; Ruggles and Holmes in their text book describe it as syphilitic; John Lyons as of varied etiology. And so on through the years the various views have been held and still are, as Talia in *Radiological Medicine*, June, 1928, describes 2 cases of linitis plastica, one of chronic inflammatory origin and another due to syphilis.

In accordance with the view of Ewing in his excellent article on the subject in 1929, I believe that syphilis of the stomach is a separate entity and that true linitis plastica or leather bottle stomach in adults, should always be considered as a hypertrophic pyloric stenosis with diffuse cirrhosis, and that all cases are fibrocarcinoma.

This view differs from the original conception of Branton, but, as will appear later, many who believed the lesion to be benign, on more careful search of the pathological material, were able to find definite carcinomatous cells.

*Read in Section on Radiology, Southern Medical Association, Twenty-Fourth Annual Meeting, Louisville, Kentucky, November 11-14, 1930.

*From the Radiological Laboratories of Drs. Groover, Christie and Merritt.

Lyle, in *Annals of Surgery*, 1911, collected 130 cases, 60 of which were disposed of as carcinomas belonging with scirrhous cancer. The remaining 70 occurred under various circumstances. A considerable group appeared to be examples of chronic gastritis, with marked contraction and thickening of the whole, or much of the stomach. The hypertrophy was mainly of the muscular coat, while the submucosa lacked the extensive overgrowth of linitis plastica.

John H. Lyons, in 1924, while at Mayo Clinic, published an article on linitis plastica in which he reported 38 cases observed at the Mayo Clinic in which the diagnosis of linitis plastica, or leather bottle stomach, was made at operation. In 25 of these cases specimens were obtained. Of the 25, the microscopic diagnosis was small cell carcinoma in 14, one was diffuse gastritis, one was fibrosis of the wall, 3 were ulcer with greatly thickened mucosa, submucosa and muscularis, one syphilis, one single muscular hypertrophy, one adenocarcinoma, and one colloid carcinoma. Lyons in conclusion states: "Several lesions may sometimes present the characteristics of linitis plastica. I believe the term should be reserved for those cases in which small cell carcinoma is found."

PATHOLOGY

In regard to the pathology and the views held concerning linitis plastica I am quoting largely from Ewing.

It has long been known and mentioned by Rokitansky and by Kaufman that the epithelial cells in scirrhous carcinoma of the stomach may be reduced to a minimum or may largely disappear, so that a very careful microscopic search is required to detect the traces of carcinoma. Over large areas all traces of epithelial structures may disappear in the thickened submucosa and muscularis. In many cases there are signs of old superficial ulcers. Many cases suggest classification with polyserositis and show multiple thickenings throughout the peritoneum, intestines, colon and rectum. But Bret and Pavoit point out that the intestinal lesions are chiefly subserous; Krompecher that microscopic study of older cases and some of the later are open to criticism, as the histology of regressing fibrocarcinoma is seldom fully recognized.

As an example of the confusion that exists we cite the case described fully by Telger, in which he completely excluded traces of carcinoma, but in which, on subsequent study by Meinel, carcinoma was found.

The usual form of scirrhous carcinoma of the stomach is easily recognized by the diffuse thickening of all the coats, the contraction of the organ often to a rigid tube, the frequent presence of metastasis, and especially by the microscopic evidence of round cell, alveolar or gelatinous carcinoma. The lesion begins in the pylorus and may be confined to this region or to the curvatures, from which it extends over a part or the whole of the stomach and occasionally to the duodenum. The pyloric orifice projects into the duodenum as the cervix uteri into the vagina. The stomach wall is 4 to 8 times the normal thickness. The new thickness is mainly in the submucosa, while the muscularis is also thickened and traversed by opaque bands of fibrous tissue. The tissue is very dense, resisting incision almost like cartilage. The mucosa is usually thrown into folds or nodular elevations, or is thin, eroded and ulcerated. The pylorus may be movable when the disease is limited to the stomach or may be fixed by adhesions. The pyloric lymph nodes are usually moderately enlarged. Extensions to the peritoneum give rise to fibrous thickenings, constricting the intestine and causing marked cicatricial contraction of the omentum. Fibrous areas may be seen over the liver and spleen. On microscopical study, islands of atypical epithelium or scanty acini of adenocarcinoma or groups of cells with mucous degenerations and atypical signet ring nuclei are found. In other portions of the same tissue only cellular granulation tissue or hyaline areas and cells of undetermined origin make up the bulk of the sclerotic areas. In the peritoneal plaques and thickenings of the intestinal wall and peritoneum, similar structures were found. Every graduation from small cell, diffuse and scirrhous carcinoma, with pronounced signs of malignancy, down to non-cellular granulation tissue, containing isolated cells with mucous globules to vascular tissue with overgrowing capillaries suggesting endothelioma, and even connective tissue without a trace of atypical cells of any type, are found. As a rule, extensive search reveals some foci of characteristic mucous cells in the submucosa or muscularis.

Ewing concludes that linitis plastica appears to be a peculiar form of gastric carcinoma, probably occurring in resistant subjects and originating from cells of limited growth capacity, which pursues a chronic course and tends to spontaneous regression of the tumor process. The course of the disease is slow. Fibrous and mucous degeneration overtake most of the cell colonies and in many areas the carcinomatous element disappears entirely and is replaced by fibrosis. The wide dissemination over the small intestine, omentum, peritoneum and colon suggests that the process was at one time more active, but eventually regressed with fibrosis. The cases which recover after gastroenterostomy may represent a final standstill of the entire

process, but all cases of linitis plastica are atypical fibrocarcinoma.

SYMPTOMS AND OCCURRENCE

Linitis plastica is not distinct from other forms of gastric carcinoma in its symptoms. The outstanding symptoms are: pain, loss of weight, appetite and strength, gas, belching, a feeling of fullness on eating even a small quantity, occasionally hematemesis and secondary anemia. Achlorhydria is the rule. There is a palpable tumor in the epigastrium. Test meals show rapid emptying. The course of the disease is variable. The shortest time recorded was five weeks and longest fifteen years in Lyons' series. In the case to be presented there was marked ascites in the last stages of the disease.

The disease is more common in men than in women and the age is from 30 to 60, hence occupying the usual age periods for other forms of carcinoma of the stomach.

X-RAY FINDINGS

The outstanding x-ray finding is the exceedingly rapid emptying of the barium meal. The meal pours through the gaping pylorus into the duodenum, which is sometimes dilated. The outline of the lumen of the stomach is that of a narrow inverted cone. The cardiac portion is usually not involved and the fundus may be dilated. The cardiac portion of the esophagus can be seen as a finger-like projection. Peristalsis in the involved areas is wholly lacking and the walls are inelastic. When the stomach wall can be seen in the x-rays the thickness is 2-10 times the normal and is greatest at the pylorus and on the curvatures, becoming thinner in the cardiac region. When such an apparent lesion is seen in the stomach, the small intestine and colon should be carefully scrutinized for other tumor masses which sometimes involve not only the intestines and colon, but the omentum and mesentery, causing it to become thickened and shortened by the fibrous infiltration.

The only gastric lesion that is likely to be confused with linitis plastica is gastric syphilis of the diffuse type, which in some cases exactly simulates it and can be differentiated only serologically or on section. In syphilis the stomach is not shortened as it is in cancer. The motility of the stomach is normal in syphilis while in cancer there are usually perigastric adhesions. In linitis plastica the clinical picture is that of cancer and the patient is usually of the cancer age. In syphilis the patient is thin, but not weak or markedly ill, is not cachectic, and there is no palpable mass in relation to the stomach defect.

In conclusion, we consider typical cases of linitis plastica or leather bottle stomach as being malignant, representing a form of scirrhous carcinoma in which an unusual type of metastasis to the mesentery, peritoneum, small intestine, colon and rectum is a rather common occurrence, but which has not been duly emphasized in the literature.

CASE REPORTS

The first case was referred to our laboratories by Dr. William Gerry Morgan, to whom I am indebted for the privilege of presenting it.

Case 1.—Mrs. A. H. R., 35, a white woman, presented herself at the office on October 23, 1929, complaining of pains in the lower abdomen after eating, of diarrhea, loss of weight and vomiting. The duration of symptoms was about three months. At this time the first examination was made.

Examination of the chest shows no evidence of abnormality of the bony framework, heart or great blood vessels or lungs. Fluoroscopic examination of the esophagus is negative.

The stomach is inelastic. The lumen is very much limited and the barium meal pours through the pylorus into the dilated small intestine. There is a palpable tumor in the region of the pylorus. The appearance is suggestive of a "leather bottle" type of stomach, which is due either to carcinoma or lues. At the 6-hour examination the head of the barium meal was in the rectum. At the 24-hour examination none of the barium meal had passed and there were two areas in the transverse colon which certainly were suggestive of an organic lesion. There was so much feces in the colon that an enema could not be adequately administered. It is suggested that this patient be thoroughly cleared and returned without her breakfast for re-examination of both the stomach and an opaque enema of the colon.

Examination of the teeth shows root canal fillings in the upper right second molar and there is some thickening of the apical peri-cementum. There are no further evidences of periapical disease. The upper left third molar is unerupted and impacted mesio-angularly. The alveolar crest shows a moderate resorption. She was admitted to Garfield Hospital one week later. A second examination was made on October 28, 1929.

Examination of the chest showed no evidence of abnormality of the bony framework, heart, great blood vessels or lungs.

Re-examination of the colon was not entirely satisfactory because the colon still contained a large amount of the barium mixed with intestinal contents and a large amount of gas. There was a filling defect just distal to the hepatic flexure, another a few inches proximal to the splenic flexure, and at the junction between the rectum and sigmoid there was a constant defect and the enema could not be forced beyond this point. The appearance was that of multiple lesions of the colon with obstruction in the region of the sigmoid and also some obstruction at the point in the trans-

Fig. 1-A

Case 1.—Mrs. A. H. R. Stomach walls inelastic. The lumen is narrowed and the opaque meal pours through the gaping pylorus in the small intestine.

Fig. 1-B

Case 1.—Mrs. A. R. H. Twenty-four hour examination shows filling defect in the ascending colon, two in the transverse colon and a complete obstruction at the rectal sigmoidal juncture.

verse colon. The exact character of these multiple lesions was not clear. Lues was the most likely diagnosis, but multiple malignancy was considered.

Physical examination was negative except for the emaciation and the presence of a palpable abdominal tumor.

The Kahn test was negative both before and after a provocative Wassermann.

Repeated attempts were made to give this patient barium enemas while she was in the hospital, but an obstruction at the rectosigmoidal juncture was encountered.

On November 5, 1929, laparotomy was done by Dr. C. S. White. The abdominal viscera were found matted together in what appeared to be a carcinomatosis. There were many nodules on the intestines and colon. A section was removed for study and the abdomen closed.

She was discharged in twenty days. She was up and around, but was bothered with massive ascites, 4-6 quarts being withdrawn every two to three weeks.

She became weaker and more emaciated and died April 25, 1930.

Necropsy was performed by Dr. J. W. Lindsay.

The finding of significance was the studding of the entire visceral and a parietal peritoneum with minute grayish nodules which were very firm. The stomach was contracted. The wall was hard and greatly thickened.

Microscopic section of the stomach wall revealed a marked narrowing of the mucous membrane, the lower border of which was preserved nearly with its usual contour. There were, however, beneath this border, scattered epithelial cells and nests of cells, irregular in size, shape and arrangement, with irregular nuclei, evidently representing malignant invasion of the deeper structures.

The nodular infiltration of the peritoneum, described above, was evidently metastasis or extension of this same malignant infiltration.

The diagnosis was linitis plastica (carcinoma) with carcinoma of the intestines and parietal and visceral peritoneum.

Case 2.—Miss N. A. T., 51, was referred by Dr. S. Ruffin on August 8, 1930, for study of the gastrointestinal tract.

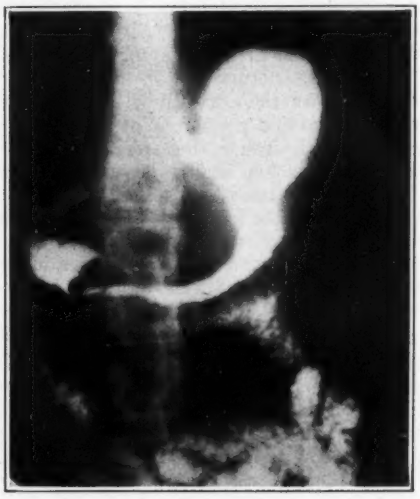

Fig. 2

Case 2.—Miss N. A. T. Typical leather bottle stomach, with sausage-shaped palpable mass.

Fluoroscopic examination of the chest and esophagus was negative.

There was a filling defect involving the pylorus and pars media of the stomach. This portion of the stomach was tube-like in character and a sausage-like mass could be palpated. The pylorus was gaping. The appearance in general was that of a malignancy of the stomach, probably of the linitis plastica type. The duodenal cap showed slight deformity of the base, due to the pressure of the tumor of the pylorus. The stomach was wholly empty in six hours and emptied very rapidly. There was a calcified nodule opposite the upper margin of the first lumbar vertebra on the right side, which might represent a calcified lymph node which might also be in the gall-bladder. At six hours the barium had reached the splenic flexure. This was largely due to the rapid emptying of the stomach. There was no demonstrable lesion of the small or large intestine. The cecum was freely movable and not tender. The patient refused to be examined by means of an opaque enema. This is of some importance, because frequently such malignancies metastasize to the large and small intestine.

Fig. 3-A
Case 3.—Mr. N. Lumbar spine showed characteristic metastasis to the fourth lumbar vertebra, and probably to the sacrum.

Fig. 3-B
Case 3.—Mr. N. The stomach presented the characteristic appearance of a new growth, involving the pars media and the pylorica.

Case 3.—Mr. N. was a man of 50. Examination of the chest showed no evidence of active pathology. The heart and great blood vessels were within normal limits.

Cholecystographic examination showed a non-filling gall-bladder and a liver shadow which was increased materially in all dimensions. The stomach presented the characteristic appearance of new growth involving the pars media and pylorica. The walls of the stomach were rigid, which permitted rapid evacuation of stomach contents.

Examination of the lumbar spine and pelvis showed characteristic malignant metastasis to the fourth lumbar vertebra and probably into the sacrum. The above findings were in harmony with the clinical picture.

DISCUSSION (*Abstract*)

Dr. J. Cash King, Memphis, Tenn.—In reviewing the literature one finds that most authorities agree that the diagnosis of linitis plastica should be reserved for those cases in which the characteristic cells of that particular type of cancer which Dr. Coe has described are found. But, we also find a number of good writers who say that many of the cases which present a pathological picture of linitis are found to be benign or made up of some other form of malignant tissue when a careful microscopical examination is made.

Clinically, we have a condition that presents the following picture: history of upper abdominal distress, loss of weight and strength; a tumor may or may not be felt in the epigastrium; x-ray study reveals a stomach that is high, its lumen greatly reduced, forming an irregular tube-like structure that runs from the esophageal opening downward and to the right almost in a straight line. It empties its contents very rapidly. However, no peristaltic action can be seen. The duodenum is usually dilated and also empties rapidly. Gastric analysis shows little or no free hydrochloric acid. This is the clinical picture of linitis plastica.

Now what diagnosis are the internist and roentgenologist to make when confronted with this picture? If they say linitis, they will be right in over 50 per cent of the cases, but certainly in a minor percentage they will be incorrect. This is in accordance with the statistics that Dr. Coe has just read.

It seems to me that some term such as the descriptive diagnostic term of leather bottle stomach could be used for clinical purposes, leaving the more detailed classification to the pathologist after he has made his microscopical examination.

Dr. D. B. Harding, Lexington, Ky.—Dr. Coe's paper presents an excellent description of the typical findings in linitis plastica. I have seen one case in which the roentgen findings were less characteristic. X-ray examination revealed an extensive nodular tumor, involving the entire pyloric third of the stomach. The filling defect indicated a cauliflower type of growth. The tumor was resected and the pathologist reported it to be a carcinoma of the linitis plastica type.

Dr. H. E. Ashbury, Baltimore, Md.—There is always a beginning of these cases which we term linitis plastica. I have had occasion to see two cases in which the roentgen diagnosis was questioned. The fluoroscopic observation revealing the absence of peristalsis was the point upon which the diagnosis was made.

At operation both of these cases were found to be early linitis plastica.

Dr. Coe (closing).—Many text books, a few years ago, said that this condition might be due to tuberculosis. Now, empirically, it is considered not to be tuberculosis. Text books have varied as to whether it is malignant or is not.

I have not been able to find in x-ray literature or surgery examples of the extensive metastasis of my case into the mesentery, peritoneum and colon, which were of absolutely the same character as the tumor of the stomach.

A YEAST PATHOGENIC FOR MAN AND ANIMALS (SACCHAROMYCETE PLEOMORPHUS VIRULENS)*

By JACK C. NORRIS, M.D.,
Atlanta, Ga.

Since 1918 I have often observed in sputum yeast-like organisms and wondered if these cells played any definite part in pulmonary disease. Inquiry of several of my colleagues brought forth indefinite answers regarding pathogenicity. Several of them considered the yeasts of no importance, usually regarding them as secondary invaders of a saphrophytic type.

During the year 1928 two patients with vague pulmonary disease harboring yeasts in their sputa were available for my study.

M. C., a colored girl, age 16 years, was admitted on August 8 complaining of headache, fever, cough, and subcostal pain. These symptoms had been present for one week. Physical examination revealed only a slight dullness and a few rales at the right lung base. She had a leucocytosis and a moderate anemia. Her temperature was of an irregular type; it became normal on September 26. Her cough was persistent and there was much sputum. On September 16 an intern noted: "Sputum produced in large quantities. It is frothy and cloudy and contains blood flakes." Her blood count revealed 6,550 white cells, 33 per cent lymphocytes and 4,000,000 erythrocytes at this time. On September 20 I reported numerous yeasts in her sputum and a pure culture was obtained. On this date I also recommended iodides and gentian violet, which were administered to her. On October 5 the cough was much better and the sputum less in amount. During her illness all blood cultures failed to reveal any bacteria. On October 26 she was dismissed to return to her home.

During her illness no tubercle bacilli were found in the sputum. The radiologist suggested an abscess of the lung.

J. W., another patient, age 58 years, was admitted to the hospital on January 30, 1928, complaining of coughing for several months, with an associated subcostal pain. He had very little fever. His cough was persistent and severe. He expectorated much frothy sputum in which minute quantities of blood were seen occasionally. Since being ill, he had lost forty pounds. Physical examination revealed a moderate dullness in the lower left chest and medium moist rales were present. The apices were not diseased. At times his temperature was normal, again subnormal, and occasionally elevated to 100 degrees. His blood count showed 7,450 white cells per cu. mm. with a moderate anemia. His Wassermann was negative. No tubercle bacilli were demonstrable in several specimens. On March 12 I found yeasts in his sputum. Uncontaminated specimens of sputum continued to reveal the presence of yeasts. The radiologist reported atelectasis and a possible pneumonic process. He was given iodides in large quantities. He was discharged in June. His cough had disappeared and he felt quite well and strong.

Both patients present the cardinal findings and symptoms that suggest pulmonary disease often caused by yeasts as recognized and described by Castellani,[1] Boggs,[2] Galbreath and Weiss.[3] The yeasts cultured were recognized to be of a similar strain, and the interesting fact that these organisms were obtained from lung cases of a similar and peculiar type stimulated me to make observations in an effort to determine their pathogenicity and characteristics in general.

Historical.—For many years certain bacteriologists have believed that there were pathogenic yeasts which produced disease in man. In 1854, Reubold[4] found oidia in the respiratory passages. Since his report, others have also isolated yeasts from numerous and varied lesions. Raum,[5] in 1891, inoculated yeasts into a rabbit which caused its death. Busse,[6] in 1894, published his first account of a pyemia caused by yeasts. Curtis[7] reported his yeast organism in 1896. The organisms of Busse and Curtis are believed to be of a similar type. Gilchrist,[8] in 1894, reported a yeast recovered from a skin disease. During the year 1898 Hektoen

*Read in Section on Pathology, Southern Medical Association, Twenty-Fourth Annual Meeting, Louisville, Kentucky, November 11-14, 1930.

*From the Department of Pathology, Emory University, Grady Hospital Division. This paper awarded the Fisher medal 1930.

and Hyde[9] recovered a yeast from a patient suffering from an ulcerated leg. Kotts and Fleischer[10] reported five cases of pulmonary moniliasis in 1926. Sir Aldo Castellani for twenty-five years has been calling the attention of the scientific world to the importance of yeasts as disease producers.

Classification.—All yeasts should be broadly classified as pathogenic, non-pathogenic, and beneficial. According to Stitt,[12] the pathogenic yeasts are classified as follows: they are of the class Ascomycetes, the family Saccharomycetaceae and the genus Endomyces. Castellani[13] divides two great classes, one *blastomycetes*, which have large cells with granules and a pronounced double contour; the other *saccharomycetes*, in which the cells are smaller without contour and the granules very fine. He considers the term blastomycosis to cover all conditions caused by yeast-like fungi. At present the classification of yeasts is unsatisfactory, and there is a crying need for a more specific grouping. As far as my studies have been pursued, it is my opinion that the organism I am presenting belongs to the saccharomycete family and is a true yeast, but does not ferment.

Bacteriology.—The organism was recovered from the sputa after implantation upon Sabouraud's media. The colonies make their appearance after the third day of incubation. At first they are very small, white, and flat. Later there is an elevation of the colony. Cultures made from an abscess in a guinea pig in which the colonies were separate showed a definite elevation after weeks of growth. The centers of these colonies were wrinkled and slightly yellow, but the periphery was very white. The edges of the colonies were very irregular and feather-like.

Repeated transplants encouraged the organism to grow fast, and colonies may occur after eighteen hours' incubation. Cultures made directly from infected animals show no evidence of growth until after forty-eight hours' incubation. The yeast grows well on any carbohydrate media. Sugars do not show gas formation. Slight acid may be produced upon maltose, rhamnose, and arabinose. Slight alkali is noted in inulin, lactose and mannite. A granular soapy pellicle forms in arabinose. Upon potato medium the growth is delayed; the colonies are confluent, smooth, fine and white, and there is no elevation of the growth. Litmus milk is not coagulated and acid is not formed. Russel's sugar shows a white butt. Alkali forms upon Endo's media. Gelatin is not liquefied. In blood serum there is no coagulation, but a fine agglutination and precipitation of the organism is seen similar to that of a flocculation. The colonies remain white on glucose agar. A yellow-brown pigment forms on maltose agar, especially after exposure to ultra violet light. The growth is restrained upon plain agar, the colonies remaining separate and very small. Glucose acid agar is best suited for the culture of this yeast. Upon this media the growth is abundant, smooth, and white colored. As the culture ages, the surface wrinkles. Cultures made from septic rabbits by withdrawing the blood from the rabbit's heart grow most satisfactorily upon bouillon made according to the formulae devised by Kracke and Teasley.[14] After several months' growth upon this medium there is gradually formed a heavy, tenacious, wrinkled scum upon the surface. In the bottom of these flasks, there is seen a heavy, chalky, precipitating growth. The older the bouillon culture,

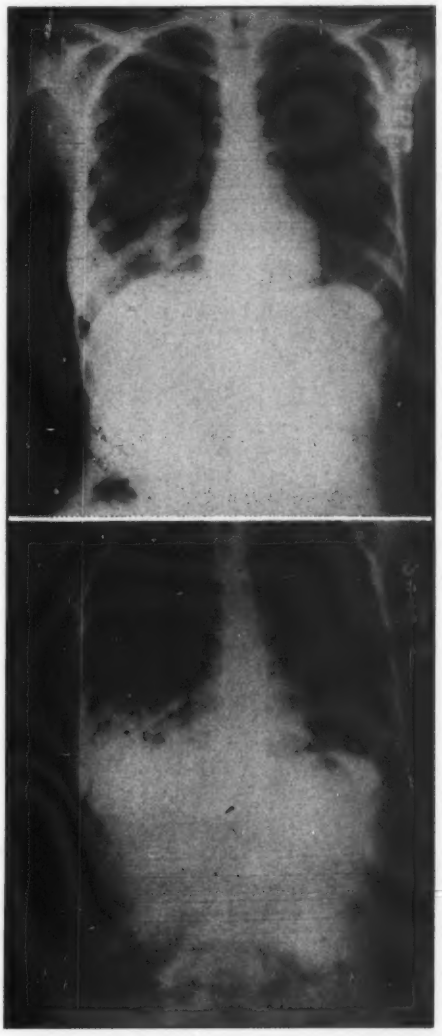

Fig. 1 (Top). Chest x-ray on M. C. showing early lesion in right base.

Fig. 2 (Bottom). Later x-ray from M. C. showing more pronounced change.

the more abundant are the interesting, ever-changing forms of the organism.

Upon lead agar after several weeks there is noted a golden pigment which is similar to the pigment of *Staphylococcus aureus.*

On maltose agar in a petri dish after several days' incubation there arises a very slight but unmistakable odor of yeast.

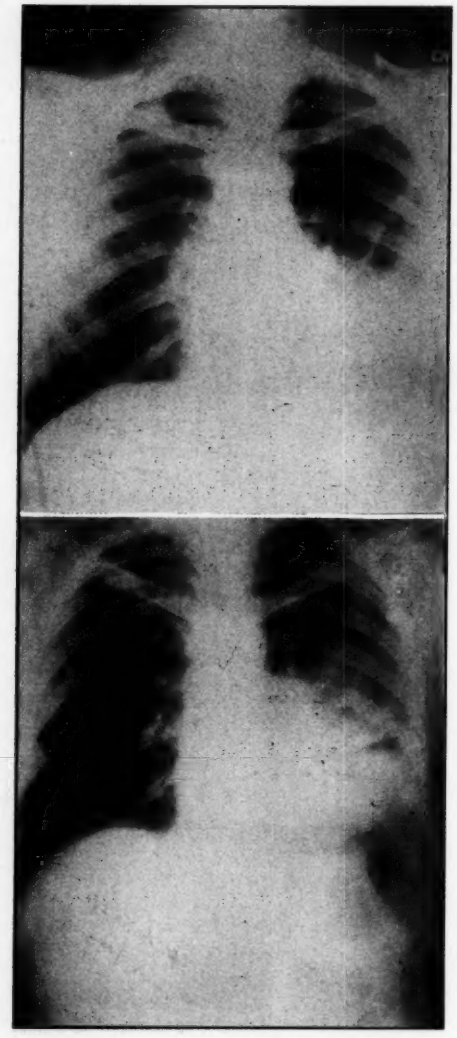

Fig. 3 (Top). X-ray on J. W. Note inflammatory change in base of lung.

Fig. 4 (Bottom). Another picture of J. W. showing spread of inflammation.

The organism grows satisfactorily with or without oxygen.

Morphology.—The yeast is at times rounded; again it is ovoid. It measures from two to ten microns in diameter. The mycelioid forms measure as much as fifty microns in length. In hydroxide preparations from abscess tissue, the organism has only a single contour with a nippling at some part of the external wall; the central content is very smooth and refractile. The cultured forms fail to reveal a definite double contour, yet there is certainly a cell within the outer membrane, the lining of which is almost shadow-like. There is always a small nucleus usually situated over to the wall side of the inner cell. Upon one occasion I have seen ovoid forms with as many as four very small nuclei; the cells were in old cultures that were made from a subcutaneous abscess in a guinea pig. The mycelioid forms vary in size, structure, and shape. They are composed of club-like bodies with indefinite joints usually growing end to end and laterally. They are singularly large at the distal extremities. True lateral conidia, as seen in the blastomycoid strains of yeasts, are not present. Attached to the mycelia are usually clusters of the oval forms which pinch off and become unattached after they reach maturity. Within the mycelia are seen encapsulated forms with a thin wall and occasional nuclei; they are usually oblong.

Reproduction.—The organism impresses me as having two methods of division, one characterized by amitosis in which simple budding occurs. The other seems karyokinetic: the ovoid forms elongate, form mycelioid types from which buds of the yeasts are born. It is very difficult to witness the intermediary steps in the life cycle.

Staining Reactions.—The bud forms are persistently gram positive. The mycelia vary in this respect according to the age of the culture and according to the tissues they are in. I have noted gram negative and gram positive mycelia. At times there are minute acid-fast granules in the round cells. Methylene blue is an excellent stain. Wright's stain is effective and demonstrates many pigments. Eosin-hemotoxylin is an unsatisfactory staining medium. In the fresh tissue 1 to 10 per cent sodium hydroxide mounts enable one to study the forms very satisfactorily.

Biological Reactions.—The only effect upon the yeast of cold temperature is an inhibition of the growth. It is not killed and the virulence remains unaltered. Heating destroys the yeast in fifteen minutes at a temperature of 58° C. Direct sunlight will kill the forms in two hours and will inhibit the growth after one hour exposure. Metaphen in dilutions up to 1 to 64,000 produces death to the organisms. Iodine, 7 per cent solutions in a 1-120 dilution, destroys the cells. Saturated potassium iodide also kills, and this solution diluted one-half strength will inhibit its growth. Gentian violet in dilutions 1-25-600 is a specific. Ultra-violet rays have no effect upon its growth, even after five exposures, five minutes each at a distance of thirty inches. It does seem to alter the chemical reactions of the organism in that a pigment forms on maltose agar.

Toxins are formed by these organisms. The Berkefeld filtrate of cultures injected into animals produces an anemia and a leukopenia and a neutrophilic depression. Agglutins were not present in animal blood after ten increasing doses of the filtrate or the killed organisms. Intravenous administration of a filtrate

protected animals from infection: indicating the formation of an immune antitoxic protective body within the blood. Precipitins were not successfully observed.

In the Animal.—The organism is the most consistently pathogenic and the most virulent of any fungus that I have ever seen, especially for guinea pigs and rabbits. For over two years the culture has never failed to produce disease experimentally. I am inclined to suggest that it has developed a fixed virus, for it seems that the animals succumb after a period of illness in which the duration is almost exactly the same.

There are several types of lesions which this organism produces clinically and pathologically:

(1) The septicemic
(2) The localized granulomata
(3) The chronic, with lung, gland, and liver involvement
(4) The meningitic

Inoculating a healthy rabbit with the organisms suspended in saline in moderate numbers will produce a severe and fatal septicemia in forty-eight hours with death occurring in three or four days. At first one observes the animal's inactivity: he is stuporous and tries to remain in one place unless prodded into moving.

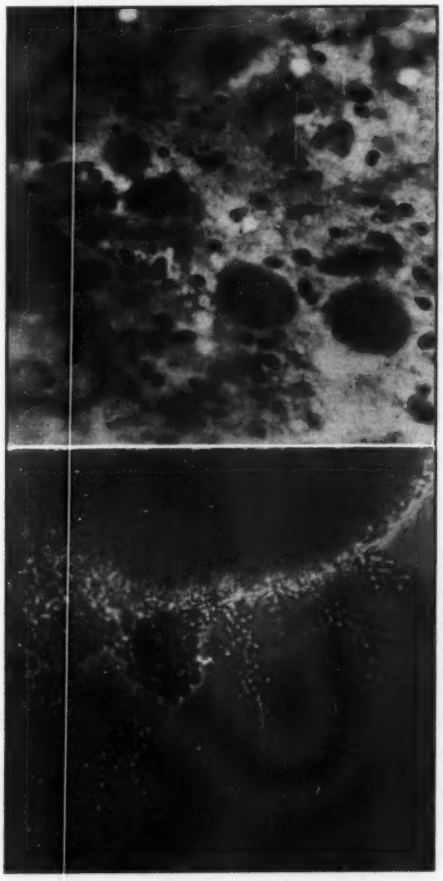

Fig. 5 (Top). H. P. F. demonstrating the yeasts in the sputum.

Fig. 6 (Bottom). Picture of marginal edge of a colony. Note peripheral extention of the organism.

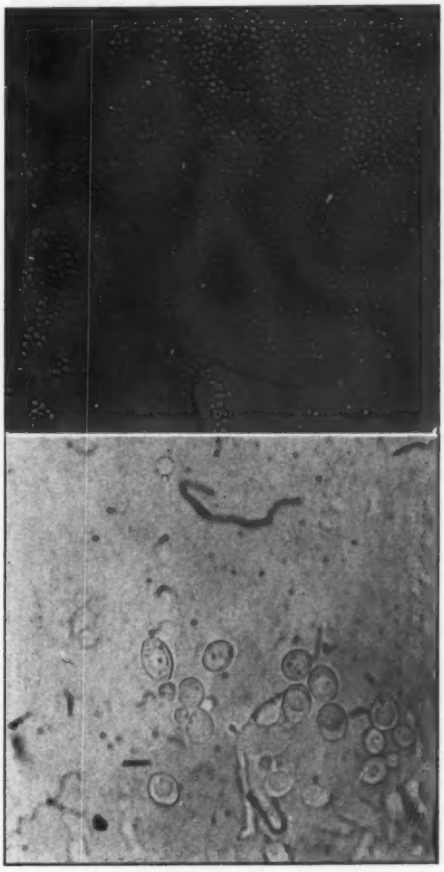

Fig. 7 (Top). Forty-three diameters of colony of yeasts.

Fig. 8 (Bottom). Large forms of the yeast as observed in very old culture.

His head seems heavy, and it droops with the nose pointing to the floor of his cage. His respirations are increased, and his heart pumps at a very rapid rate. The cardiograph tracing indicates a weakened myocardium; finally semi-comatose and comatose states ensue; fecal and urinary incontinence are noted, and death occurs. At the onset the temperature exceeds 102° F.; later it becomes subnormal; the leucocytes are often about 16,000 cells per cu. mm. Suddenly there is a drop in the total white cells, and a leukopenia occurs. The neutrophils almost disappear from the circulation; the lymphocytes increase in the differential smear, and immature cells such as myelocytes and nucleated erythrocytes are present.

A moderate suspension of the yeast injected subcutaneously into a rabbit or pig produces a semi-solid resistant tumor mass in about fifteen days. This mass has sinuses from which white semi-caseous detritus exude. Peripherally the gland is surrounded by very acutely congested tissues. The adjacent lymphatics are not in-

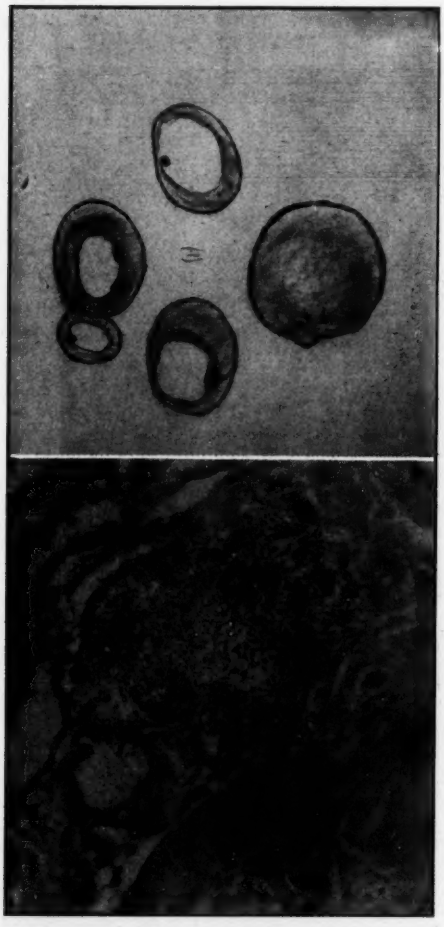

Fig. 9 (Top). Free hand illustration of interesting forms of yeast as observed in infected pig.
Fig. 10 (Bottom). H. P. showing organism in kidney tissue. Note cloudy swelling of tubule and necrosis.

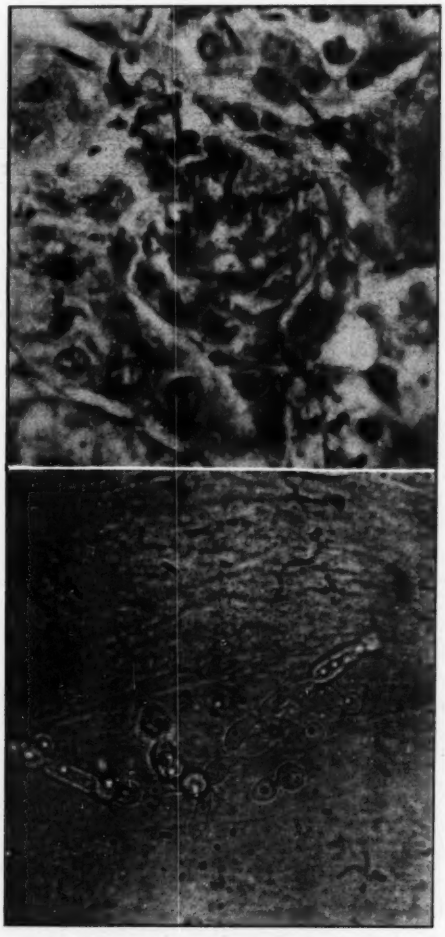

Fig. 11 (Top). H. P. F. showing mycelioid forms in tissues.
Fig. 12 (Bottom). Hydroxide mount of organism in the tissues.

volved, and this lesion seems purely local. The internal organs are not involved.

The pulmonary infections tend to chronicity. One animal, No. 204, was inoculated within the lung parenchyma by an intrathoracic injection. During the onset he had an increased leucocyte count for three days, and a leukopenia for two days, and I feared a septicemia. After a week his cell count was 11,000 cells per cu. mm.; the counts following averaged 7,000 cells. He received the inoculum August 21, 1930, and was autopsied on September 25, 1930. He had lost considerable weight and his red cells were of a poor quality. Necropsy revealed the lung receiving the yeast to be in a congested state. There were small white areas within the parenchyma. The hilus glands were enlarged, congested, and white. They had white caseous centers. The other lung was not diseased. This animal's liver was studded with white, elevated, smooth, irregular nodules which also contained semi-caseous and cystic fluid. The retroperitoneal lymph nodes about the liver bed were similar to the other areas of disease observed.

Intraspinal inoculations produced a decided reaction characterized by rapid respirations and a rapid pulse. There was a moderate stiffness of the neck. All reflexes seemed to be exaggerated. The leucocyte count was 16,600 cells per cu. mm. with an average of 14,000 cells during the illness. The spinal fluid was cloudy and the cell count was 2,000 per cu. mm. Before death, paralysis occurred. The post-mortem revealed a congested brain, many fibrinous adhesions, and collected areas of white pus-like material. The cells in the smears from the brain fluid showed a preponderance of lymphocytes.

In every animal inoculated and in every lesion produced the organism was present, and in every instance it was recovered by cultural methods.

An interesting observation is the similarity of the blood reactions in the animal to those of the patients presented in this paper: after the lung disease was apparent in the human, there was a tendency to leukopenia, and one patient had a lymphocytosis.

Intranasal instillations into a guinea pig produced what I thought was a glandular enlargement about the bronchi, but I was unable to recover the yeast from these glands.

Clinical Pathology.—The nitrogenous elements of the blood are increased in the septic animals. The urine contains albumin, acetone, and pus cells. The polymorphonuclears are at first increased; later they are depressed, and lymphocytes are produced. Cells of the myeloblastic types appear in the circulation as the severity of the infection progresses. The erythrocytes lose their normal staining reaction; the hemoglobin is diminished. Chronicity stimulates lymphoid tissue and lymphocytosis.

General Pathology.—The septicemic animals have an enlargement of the liver, spleen, and kidneys. There is also moderate cloudy swelling. The omentum is often shreddy and has areas of gangrene upon it. There is free turbid fluid within the peritoneal cavity. Cut sections show areas of focal necrosis in these tissues. Often the kidneys have numerous pin-point white degenerative areas that extend from the capsule to the pelvis. The bladder is frequently distended and contains a cloudy urine. The heart is deeply colored and softened. His-

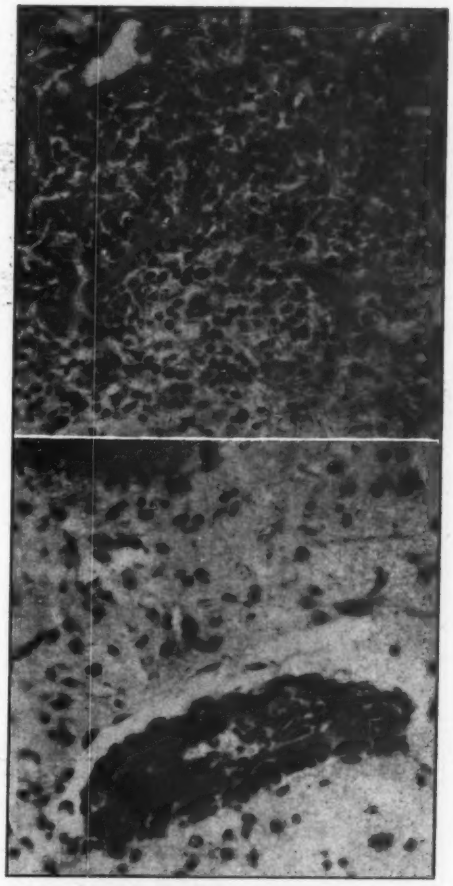

Fig. 13 (Top). Pathological study of the changes observed in the liver of an animal with chronic infection. Note round cells, plasma cells and occasional polynuclear.

Fig. 14 (Bottom). H. P. F. illustrating the histological reaction about a vessel in the brain. Note round cells.

tologically the reaction in the organs is characterized by cloudy swelling, fatty degeneration, and necrosis. The organisms may be seen within these areas of infection.

The animals with meningitis histologically show cloudy swelling of the brain tissue in general. The nerve cells are swollen and granular; a perivascular infiltration of round cells was noted in one animal, similar to that noticed in encephalitis in humans; lymphocytes and polynuclears are scattered throughout the brain substance.

Within degenerative areas of a semi-caseating type, there are seen polymorphonuclears, lymphocytes, eosinophils, and plasma cells. Chronicity of the lesions reveals a decreasing of the neutrophils with increase in the lymphocytes and plasma cells; occasionally an atypical giant cell is seen.

Necropsy Report.—For completeness the autopsy performed upon rabbit No. 204, which was inoculated into the lung, is briefly reported:

Remarks.—This rabbit has lost weight; the bony landmarks are prominent. The development is good; the nourishment poor.

Peritoneal Cavity.—Both lungs show moderate congestion. The right lung has considerable congestion and a few white areas upon the surface. The hilus glands upon this side are enlarged and soft. They contain semi-caseous detritus. The yeasts are present in the smears.

Fig. 15. The fresh tissues of an animal with systemic lesions. Note glands about lung hilus.

Pericardial Cavity.—No adhesions noted; the surfaces are moist.

Heart.—Musculature pale and flabby; no petechiae observed. No valve defects seen.

Liver.—Considerably enlarged. There are numerous white elevated smooth nodules over the surfaces; cut section shows white semi-cystic and caseous material; the glands beneath the liver are also enlarged.

Spleen.—Slight enlargement; congestion.

Kidneys.—Slight enlargement and slight congestion.

Gastrointestinal.—Mucosa red and congested; there are no ulcers seen.

The Basis for Etiological Incrimination.—The following facts in association with this yeast and its characteristics, which I feel are enough definitely to include this organism among the disease producers, are:

(1) The constant observance of the organism in the sputum of the patients studied.

(2) The finding of the organisms within the phagocytes.

(3) The similarity of the blood reactions in the animals as compared to those of the patients studied.

(4) The absence from the sputum of tubercle bacilli.

(5) The recovery of the patients when given iodides and gentian violet.

(6) The effect upon the organism recovered of the chemicals administered to the patient.

(7) The fulfilling of Castellani's[16] postulate for pathogenicity, by producing pulmonary disease in the animal.

Comparison and Differentiation of the Organism.—It is impossible at this time positively to classify this yeast. Two years' observation of the organism makes me feel that there are many of the yeasts that might be unified into one class or family. I am also certain that there is very much information needed about this group of organisms and about fungi in general.

Of the genus monilia, the zeylanica and the zeylanoides have many similar features, and almost identical sugar reactions. There is an exception in the zeylanica: it ferments one sugar which mine does not. The zeylanoides turns lead agar black. My strain produces a golden pigment on lead agar.

Castellani lists three blastomycoid fungi which do not ferment sugars. However, they are larger

Fig. 16. Culture upon acid glucose agar.

than the strain I have; they also produced true lateral conidia, aerial hyphae, a marked double contour, and grow heavily upon potato medium.

The oidia are most often fermenters; they are also larger than my organism, and they have large, well-formed nuclei, and mycelia formation is pronounced.

Numerous other strains of reported monilia are constant fermenters of sugar.

Busse's organism fermented saccharose.

Gilchrist's yeast was not consistently pathogenic. It had a definite double contour, and mycelia were never observed in tissues.

Hektoen and Hyde's strain fermented maltose and dextrose.

Cryptococci never form mycelia and do not grow on sugar media very satisfactorily.

I have been unable so far to find in the literature the description of an organism whose morphological and cultural characteristics absosutely agree with mine. I therefore take the liberty of suggesting for this strain of yeasts a name descriptive of its characteristics: *Saccharomycete* because of its family; *pleomorphus* because of its remarkable ability to change its shape and size; *virulens* because it has never failed to produce disease when inoculated into animal tissues.

I believe this organism and its allied group to be of serious importance as a disease producer within the lung of the human; and I propose to study further to substantiate or disprove this idea. Other writers also express a belief in the importance of the organisms. Robert Craik[17] believes that yeasts, particularly monilia within the bronchi, predispose to tuberculosis. Colonel E. P. Merritt found yeasts, some of which were pathogenic, in the sputum of 40 per cent of a group of patients with suspected tuberculosis.

I want to express my appreciation to Dr. E. L. Bishop, Miss Alice Garretson, Miss Grace Hunnicutt, and my entire laboratory force for the aid they have given me during the years in which experiments with this yeast were performed.

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DISCUSSION (*Abstract*)

Dr. Roy R. Kracke, Emory University, Ga.—I am associated with Dr. Norris and I have observed much of this work.

This organism is peculiar, first, because it does not conform to the characteristics of any organism heretofore described. Therefore I think Dr. Norris is justified in reporting it as a new organism. In regard to fulfilling Koch's postulates, I do not think we should say Koch's postulates but rather Dr. Castellani's postulates, because he is regarded as the authority, but certainly Dr. Castellani's postulates have been fulfilled with regard to this particular yeast.

For many years we have been concerned with these yeast-like organisms in sputum. I was particularly in-

terested in one of the scientific exhibits from the Oteen veterans' hospital. It shows a large number of yeast-like organisms isolated from the sputum. Formerly we have regarded these organisms as non-pathogenic. We have regarded many of them as saprophytic and not as producing the disease, but as secondary invaders.

It is only by cultural characteristics, by inoculation on sugars that we can identify this organism. Certainly it does not produce the same sugar reactions as the organisms that have been described by Castellani up to this time. However, we must take into account the fact that when we are dealing with sugars there is a wide variation in the type of sugars and the character of sugars used when they are supplied by different manufacturers. It is quite possible for an organism inoculated on two sugar bouillons, for instance, identical except that two different manufacturers' sugars are used, to give quite different results.

I think certainly Dr. Norris is justified in introducing this as a new member of the group.

Dr. Alfred Blumberg, Oteen, N. C.—At Oteen, we are quite interested in the question of pulmonary mycosis, inasmuch as we have found in recent literature repeatedly descriptions of this condition which is attributed to a variety of organisms. In our work we first examined sputums for the presence of fungi. Later we used material obtained at necropsy from bronchial and pulmonary cavities. Finally we employed specimens removed by means of the bronchoscope. I wish, at this time, to express our thanks to Dr. Louis H. Clerf, of the Jackson Clinic, Philadelphia, for his kind cooperation in this matter. All in all, 1,040 persons were examined and 140 of these were bronchoscoped. Among the latter were patients who had foreign bodies, neoplasms in the lungs, bronchiectasis and bronchial asthma. Of the remaining 900 persons the great majority had pulmonary tuberculosis, some had bronchiectasis or bronchial asthma, and some showed neither clinical nor roentgenologic evidence of pulmonary disease. We isolated fungi in almost 40 per cent from the specimens cultured. Among the organisms were *Aspergillus niger, flavus, ochraceous, sydowi;* monilioid types, cladosporiums; Penicilium. We are greatly indebted to Dr. Charles Thom, Mycologist, Bureau of Chemistry and Soils, U. S. Department of Agriculture, for help which he has given us.

I do not wish to make a conclusive statement as yet, though it is my impression that these fungi are secondary invaders. The methods adopted to show that they are primary invaders are not convincing. There is evidence that the organisms of Dr. Norris were pathogenic to animals, though they may have been perfectly harmless to man. I hope Dr. Norris will continue the study of his organism and give further information of his results at some future time.

Dr. William Litterer, Nashville, Tenn.—I should like to ask Dr. Norris what media he used in determining the toxin production of this micro-organism and how long did it grow? What symptoms did the Berkefeld filtrate produce in the animals? If a toxin is produced, an antitoxin might be obtained.

Dr. Foster M. Johns, New Orleans, La.—I should like to assure Dr. Norris that several of us have been very assiduous in trying to classify types of fungi found in sputum on successive examinations and not on one examination alone.

Frankly, from the appearance of the photomicrographs, I would class this type of organism as a sporothrix.

Dr. Norris (closing).—For the toxins, I used cultures that had grown for several weeks in bouillon. The bouillon was neutral in reaction. The fluid culture was passed through a Berkefeld filter and the filtrate injected into rabbits. The rabbits previously had their hemoglobin determined and had repeated blood counts by myself and the technician working with me. After several inoculations, beginning with 1, 2, or 3 c. c. of this filtrate, we noticed a drop in the hemoglobin, then a change in the shape and contour of the cells and immature cells appeared in the circulation. After a period of about ten or twelve days we noticed the reaction was reversed; the red cells approached normalcy and the hemoglobin increased.

We were very careful to avoid contamination. These organisms were found repeatedly. We collected sputum in the morning and later in the evening, and we found the yeasts on all occasions.

I do not think the organism is a sporothrix.

THE HEALING OF TUBERCULOSIS, WITH SPECIAL REFERENCE TO RESOLUTION*

By C. H. Cocke, M.D.,
and
S. L. Crow, M.D.,
Asheville, N. C.

As recently as twenty-two years ago, when Klebs' "Tuberculosis" was the accepted best work in English on the subject, the process of repair or healing in tuberculosis was supposedly limited practically to fibrosis and calcification. The rapid development of the roentgen ray, and especially the improvement in the film, making possible serial pictures at more or less frequent intervals, have added materially to the knowledge concurrently gained from observation in the laboratory and in the experimental animal of the pathogenesis and methods of healing in tuberculosis.

It is quite manifestly impossible in the allotted time to attempt a comprehensive discussion of so broad a field as is indicated by the title of this paper; but certain fundamental facts relative to the healing of tuberculosis are considered worthy of reiteration; and a demonstration of a few selected films will be made with the hope of impressing upon the general internist the importance of what happens within the

*Read in Section on Medicine, Southern Medical Association, Twenty-Fourth Annual Meeting, Louisville, Kentucky, November 11-14, 1930.

chest of a tuberculous patient. I still find all too prevalent great pessimism as to the patient's outlook in the presence of extensive disease or over the development of a cavity, for instance. This is not the place, nor do we wish to revive the discussion of annular shadows, which animated and informed the literature of tuberculosis a few years back. Suffice it that it is now generally accepted as a fact, and we shall attempt to prove it to your satisfaction, that such annular shadows as are shown by serial films do contract and disappear, and may leave no trace of their former presence in cases which are unequivocally not of the so-called pleural type. In other words, pulmonary cavities, definite so far as our present clinical and roentgenological studies can determine, will disappear.

Let it be understood at the outset that this discussion deals only with tubercle infection that has caused sufficient disturbance of the hosts' physiological economy to be known as clinical tuberculosis. No attempt is here made to discuss those particular attributes of the parasite that cause the progress of the infection, or the varying degrees of virulence possessed by various strains of bacilli, though a limited discussion is offered of some of the determining factors of healing inherent within the host. While the attempt here is to treat the matter from the standpoint of clinical progress, it is well to point out that this by no means always parallels the pathologico-anatomical changes which may be discovered. In other words, clinical progress is not synonymous with pathological regression; nor does pathological regression always indicate symptomatic improvement. What, then, determines the question of the healing of a lung, without regard to the extraneous circumstances of the patient's life or the controllable factors in his cure? (The word cure is used advisedly, with only the comment that whereas twenty years ago it signified an economic concept of a return to normal productive business and social life, under given limitations of greater or less degree, today it is possible and proper to speak of the apparent physiological and anatomical cure of tuberculosis, though it is admitted to be less frequently observed.)

It is easy to assert that the patient who gets well of tuberculosis does so because of high resistance, and hence immunity; but I know of no other disease in which the terms are used more loosely or with less apparent comprehension of their true meaning. Why one patient apparently overcomes a widespread infection with ease and another goes on to progressive destruction, from apparently not dissimilar beginnings, is the daily problem met by the phthisiologist. To say that in one case there is failure of resistance while in the other it is high, and hence protective, is to say all, and mean almost nothing. Resistance to tuberculosis can mean only the ability or capacity of the body to protect itself from the tubercle bacillus and limit its growth and effects. It presumes a particular reaction to the specific irritant, the bacillus, sufficient to limit its spread. If the body reac-

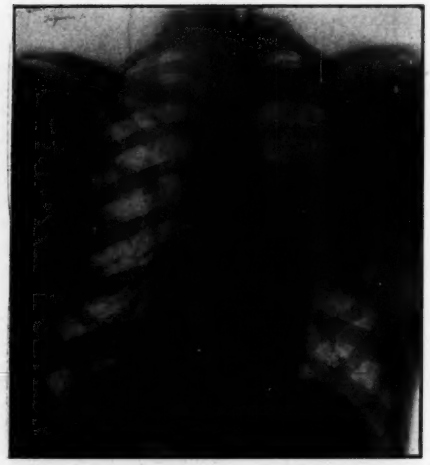
Case 1, Fig. 1

T. M., female, age 23. July 11, 1928. Marked right-sided scattered infiltration; cavity second interspace; left lower lobe infiltration.

Case 1, Fig. 2

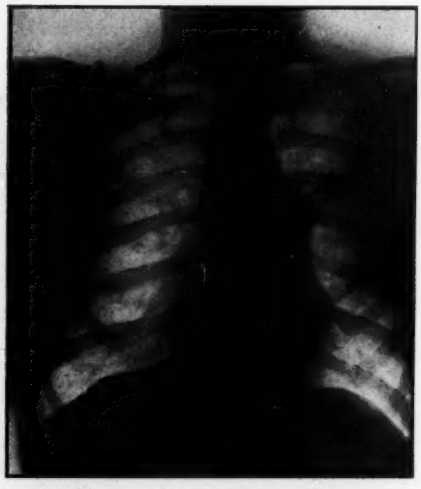
T. M., female, age 23. June 14, 1930. Complete clearing by resolution of practically all pathology.

tion is insufficient to accomplish this, we speak of lowered or absent resistance. In any event, there is the inevitable reaction between the body and the bacillus, which reaction must be considered in the light either of the body's effort at adaptation to an irritating parasite, or else a protection against it. Granting the noxious attributes of the invader, this reaction, which immediately ensues upon its entrance into the body, must be in the nature of resistance upon the part of the body. All life is in perpetual reaction to the hazards of environment, circumstance, nature, occupation, infection and a hundred other forces. To survive is to follow the laws of adaptation and resistance to the various harmful influences and invasions to which we fall heir.



Case 2, Fig. 1

C. W. M., male, age 24. Fairly acute fulminant history of six weeks. October 2, 1926. Complete left-sided tuberculous involvement; cavity in second interspace; pneumonic consolidation midfield; slight extention to right upper.



Case 2, Fig. 2

C. W. M., male, age 24. October 2, 1929. Complete disappearance of cavity; slight fibrosis in area of former consolidation.

Now what happens in the human body when the tubercle bacillus invades it? Omitting a discussion of the possible opportunities for and the routes of invasion, and stating the story only in the sketchiest of forms: no reaction occurs so long as the bacilli remain upon the epithelial surfaces of the mucous membranes. Once the bacilli proceed farther, say to a lymph node in the neck, immediately a response is made; and the tissues react in a specific way by the formation of a definite bloodless growth, which encompasses and encysts the bacilli, and thus shuts them off from the rest of the body. This is the classical tubercle known to you all. Now, as long as the bacilli are imprisoned within the walls of the tubercle, and have no communication by means of blood or lymph with other tissues, and the tubercle undergoes no softening, the body is safe from these bacilli. Undoubtedly, this is as far as the story goes with the majority of people, for only a percentage, and that an encouragingly diminishing one, ever develop tuberculous disease as distinct from tubercle infection outlined above. Do the 90 or more per cent of the practically 100 per cent who are infected at one time or another possess an immune substance (or substances) which protects them from the disease? None has thus far been demonstrated. Furthermore, since the only immune animal to tuberculosis is the one that has developed anatomical tubercle, it is obviously true that there is no such thing as natural resistance to tuberculosis in the sense of protecting immune substances born into the body which will protect against and neutralize tubercle bacilli that have gained entrance into the body.

Whatever be the nature of immunity in tuberculosis, it must be stated that it is never complete, that it varies at different times and under different stresses, is sometimes sufficient to protect from clinical disease, and at other times is sadly deficient. Clinical tuberculosis is there-

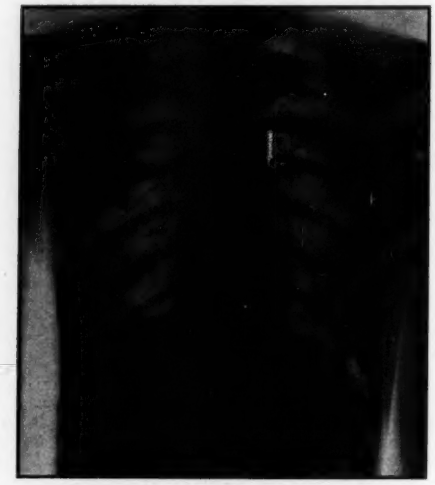
fore the well known complex of progress and regress, improvement and frequent relapse. If one ignores the question of the mechanical factors of resistance offered by the barrier of the anatomical structure of the tubercle, its location and poor vascular and lymphatic connection with other tissues, what is the nature of the specific resistance to tuberculosis? As at present understood, the appearance and exacerbation of symptoms is probably due to the spread of the tubercle to fresh or virgin but allergic tissue. The allergic response is possible only in the immune body; for, as was pointed out by Krause, the parallelism between allergy and specific immunity in tuberculosis is so great that immunity is a function of allergy. There is no specific immunity without preexisting tubercles, just as there can be no allergy. Immunity appears in a remarkably short time after the development of the tuberculous focus, and allergy is coincident therewith. Both immunity and allergy wane with the healing of the focus and disappear with its eradication, and both vary directly with the intensity of the disease.

The tuberculosis which we treat (and it is the only tuberculosis that can be successfully treated) is then that of reinfection, whether of endogenous or exogenous origin, the spread of the tubercle infection in the allergic paient, all of whose body tissues are apparently allergic, though whether equally so at any given time has not been fully determined. It is only by appreciation of this that we can hope to understand "the enormously multiplex and multicolored pathological background of tuberculosis," as Krause says. But just here I would reiterate what I stated some years ago before this Section in discussing the possible role of mixed infection, that tubercle bacilli alone can and do produce every known tuberculous lesion. It is not essential for the understanding of the symptomatology and progress of tuberculosis that we seek more than a knowledge of the tubercle bacillus in allergic soil. Practically every symptomatic outbreak is the result of the effect of the tubercle or its proteins reacting in a specific way, though the degree and violence of the resulting symptoms are varied in the extreme. The complete story of the healing of tuberculosis cannot now be told. In the brief limits allotted this presentation we can only mention, without proper discussion, the doubtlessly important role of phagocytosis; the retardation offered to the dissemination of the bacilli by allergized tissue; the processes of repeated desensitization to bacillary and other protein toxins which are constantly going on (the whole basis of tuberculin therapy, which can never be a whole cure); the repair of destroyed tissue; likewise the great role of inactivation of bacilli by encystment or encapsulation in calcareous or fibrous tissue. Each of these is a fascinating and still not fully told story; but our purpose

Case 3, Fig. 1
Mrs. W. T., age 38. November 21, 1928. Right lower lobe cavity with infiltration below.

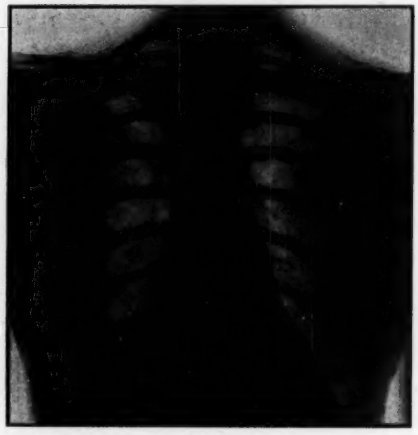
Case 3, Fig. 2
Mrs. W. T., age 38. April 23, 1930. Complete disappearance of cavity, and only thickened pleura remains.

today is to attempt only cursory mention of these processes, and rather to show by serial films what can and does take place in the healing of sometimes enormous quantities of tuberculous tissue, particularly by resolution. Of all the processes of repair in tuberculosis, this is by far the one most to be desired, though unfortunately it cannot be controlled. It leaves less impairment of function naturally than fibrosis and pleural symphysis, with their consequent frequently shrunken chests, displaced and disturbed circulatory organs and the ensuing compensatory emphysema that follows extensive scarring.



Case 4, Fig. 1

Mrs. I. P. B., age 26. Weight 93 pounds. Pregnancy. Therapeutic interruption. May 19, 1926. Tuberculous infiltration and cavitation right upper lobe. Well marked wall to cavity.



Case 4, Fig. 2

Mrs. I. P. B., age 26. October 24, 1929. Weight 133 pounds. Complete disappearance of cavity, with absorption of most of its wall.

What then happens in a case of tuberculosis? The earlier conception that the tubercle was an immutable pathological form, like a tumor, was responsible for the failure to appreciate the really important part that resolution plays in the healing of tuberculosis. The surgeon long since has reported the complete healing of the peritoneum and the testicle, while the disease in the eye has been seen to disappear, leaving no trace of its former presence. The disappearance of cervical nodes, under appropriate management, is the fortunate experience of us all.* The serial film is now teaching us that in a much greater measure than formerly was thought possible the same thing is going on in the lungs, which is quite comprehensible in view of the fact that the specific response of allergic tissue to reinoculation with tubercle is inflammatory in nature. This reaction may vary all the way from mild hyperemia to exudation, even with violent and extensive necrosis, and when the latter has gone on to a sufficient degree, naturally complete restitution is not to be expected. Although caseation and necrosis, with the resultant expectoration, are distressing to most patients, as well as to their physicians, healing can take place when they are present. Softening, enucleation and expectoration of foci are essential to healing in many cases. In fact, there might be no healing in many cases without such a process. Can caseation be said to resolve? Certainly it would seem so from roentgenologic as well as from clinical studies, though, of course, it cannot be too often or too emphatically stressed that the x-ray does not categorically label caseous lesions for us; and lesions so-called may well not be caseous. The x-ray only registers densities, and the assignment of names to things seen is the province of the observer. The same thing may be said of the sounds heard by an examiner. But we do know that caseation is frequently replaced by fibrous tissue. And, having seen what are commonly assumed to be fibrocaseous lesions disappear with remarkable, and at times almost incredible thoroughness, one

*The almost total disappearance of this form of the disease is today a truism, and at the same time a tribute to improved dairy herd inspection and testing and to the benefits of the improved sanitary and economic basis of modern American life.

is prone to feel that either resolution is a much more important phase of the healing process in tuberculosis than is commonly assumed, or else the time is here for a revaluation of roentgen ray interpretation.

What happens when a large, caseous area undergoes liquefaction, with resultant cavity formation? Irrespective of the ultimate outcome in a given patient, I am prone to look upon cavity formation as a conservative process in many instances, paradoxical as this may sound. Without the elimination of this cheesy material through the bronchus it is hard to conceive of the possible relief from recurring reinfections that would harass and eventually overcome the patient. What becomes of these cavities? The pathologist will tell you that he has never seen a completely healed cavity at autopsy. Naturally, he cannot speak of what has disappeared in the healed subject, for his studies are usually on the body of the patient who has died from progressive disease. Certain thin-walled cavities, mostly of inflammatory nature, in which fibrosis has not proceeded too extensively, undoubtedly do disappear.

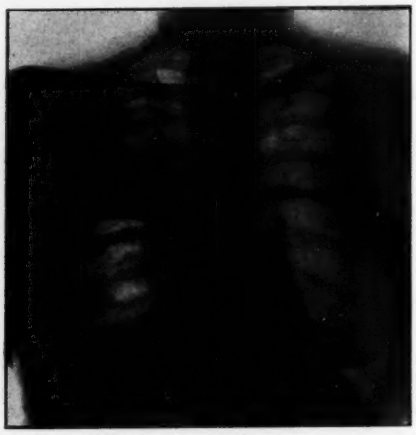
What lesions, then, in the healing lung may we expect to disappear so far as discovery of them may be made by physical exploration or x-ray examination? To begin with, the more recent a lesion is in tuberculosis, the more it partakes of an inflammatory nature, and naturally the greater the possibility of complete resolution. Exudative processes, then, even up to the infiltrations of pneumonic areas, may completely disappear, though time may be the essence of the accomplishment of this; and unless the case is followed for years, this will probably not be recognized. Fibrocaseous lesions, as they are commonly tagged in roentgenological parlance, are seen to shrink so markedly that one cannot escape the feeling that some resolution perhaps of true caseation may occur. The more productive the lesion, that is, the more fibrosis there is present, the less possibility there is of resolution, once the inflammatory condition changes.

What of the auscultory phenomena associated with these disappearing lesions? Unfortunately, diminishing physical signs and roentgenological findings do not coincide. It is not uncommon to find persisting physical signs while the film shows almost, if not wholly, vanished pathology. The explanation of this discrepancy cannot be elaborated here. It probably lies in the persistence of certain definite changes imperceptible to the ray. Given a patient who is symptom-free for a sufficiently long period, under conditions of ordinary life, in whom pathological findings formerly demonstrated by x-ray have become negative, it is fair to assume that he is healed, even in the presence of adventitious chest sounds.

Case 5, Fig. 1
Dr. H. E. W., male, age 31. April 1, 1929. Left upper lobe cavity, with infiltration. Slight right spread.

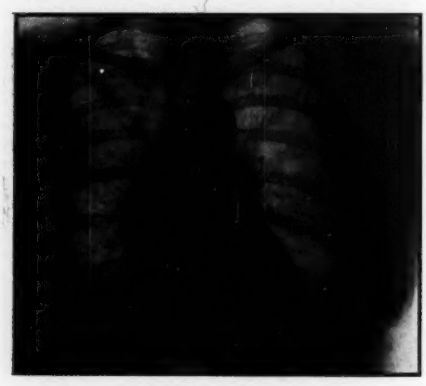
Case 5, Fig. 2
Dr. H. E. W., male, age 31. February 6, 1930. Complete disappearance of cavity, with only fibroid scars remaining.

For some years I lived in rather mortal dread of tuberculous disease in the adolescent, having been schooled in the faith that nature, in her efforts at developing adulthood from its budding material, had little force left to combat so fatal a malady as tuberculosis, and that consequently this was the dangerous age. A wider experience with the disease in this age group, and enlarged vision as a result of studies of the films of many such cases have completely changed my views as to the reparative and healing capacities of these young people; and I shall endeavor to show on the films what happens, not in isolated instances, but quite frequently, namely: that in this age group healing and resolution not only take place regularly, but apparently in many cases with considerably more rapidity than in older patients.



Case 6, Fig. 1

Mrs. B. M. H., age 57. June 19, 1926. Complete right-sided involvement, fibrocavernous; definite cavity in the upper lobe; suggestive one in the lower.



Case 6, Fig. 2

Mrs. B. M. H., age 57. September 20, 1927. Complete clearing of all pathological findings, save a slight fibrous band.

It is then quite apparent that factors outside of the extraneous ones of the hazards of life, occupation, and activity may determine the course of tuberculosis. The anatomical structure of the tubercle, its location with respect to opportunity for spread by rupture into the blood or lymphatic streams, the time and stress elements, the patient's age and coexisting physical conditions, all may play their part. But over and above these, and disregarding the possibility of there being some as yet undiscovered immune substances to determine the result, the human body shows a marvelous reparative zeal in widespread pulmonary tuberculosis. This is demonstrated by an enormous capacity for fibrosis and a perhaps greater capacity to heal by resolution large quantities of tuberculous tissue. The serial film has thus confirmed in the human what laboratory animal studies had shown. The presence of a cavity is no longer the herald of impending doom, as was formerly held. It may completely heal and disappear.

DISCUSSION (*Abstract*)

Dr. Paul H. Ringer, Asheville, N. C.—The idea has been prevalent among the profession that pulmonary healing takes place by fibrosis and calcification alone, and that complete resolution in certain portions of the lung affected with tuberculosis is hardly to be expected. The fallacy of this belief is shown in the series of films which Dr. Cocke has exhibited.

These films must have a considerable effect upon the question of prognosis. They will make our prognosis less favorable than it has been in the past, because now as we look at a mass of tuberculous tissue on the film we know that in certain places resolution will take place, wholly or partially, and in others fibrosis and calcification will ensue. These films also show the enormous advantage of prolonged bed-rest. While Dr. Cocke has not so stated in his paper, I know that none of these cases has had tuberculin or compression therapy. The very excellent results portrayed refute the argument of those who would subject every unilateral case to some form of compression.

Dr. F. M. Pottenger, Monrovia, Calif.—Dr. Cocke's paper has shown that he has faith in nature's power to heal tuberculosis. I am one of the same faith. We have had so much pessimism regarding tuberculosis that it has taken us a long time to find out how curable a disease it is.

It is generally accepted that the exudative type of tuberculosis is the one that does not offer good chances of healing, while the proliferative type does. This is

not my experience, nor does it seem to be the experience of Dr. Cocke. The most satisfactory type of tuberculosis is the one that will heal and leave a clear lung field. That is the exudative type. The proliferative type, on the other hand, is the one that heals and leaves a greater amount of scar in the lung, because it starts with fibrosis and continues as progressive fibrosis; and the fibrous tissue cannot be removed. An early exudative lesion will heal readily under proper care and leave the patient in the best possible condition for the future.

The question of reaction in pulmonary tissue (the allergic inflammatory reaction) is to me a very interesting one. Wherever we have inflammation the cells in that area are negatively charged and the vessel walls have their permeability increased. Consequently, those areas are subject to stimulation and hyperemia when other areas are not. Some work has been recently reported in the *Journal of Experimental Medicine*, in which it was shown that iron injected into the peritoneal cavity of a normal guinea pig quickly passes out of the cavity and goes to the lymph nodes. However, when the peritoneum is the seat of inflammation and iron is introduced, it is restrained and held back, and does not pass readily to the lymph nodes. Another experiment was performed by producing inflammation in lymph nodes. Following this, iron injected intravenously collected in the inflamed nodes. It was held in the blood vessels until it reached those areas in which the walls of the vessels were more permeable and then passed through to be deposited in the inflamed nodes. In animals in which iron was not injected, an amount of iron above the normal, from broken-down hemoglobin, was collected from the inflamed nodes. Blood serum injected intravenously could also be obtained from these nodes. This explains to us what takes place in the hypersensitive areas about active tuberculous foci. The tuberculous patient gives himself interrupted doses of tuberculoprotein, which gains access to the blood stream and in circulating is held within the blood stream until it reaches areas of increased permeability about the foci. There it passes through the blood vessels and produces its specific reaction. Thus a focal reaction can be produced cumulatively without a general constitutional reaction. This is the way that the gold preparations and also remedies used for their non-specific reaction produce reactions in the tuberculous foci. We have strong clinical evidence that as the patient's immunity increases his cells become less sensitive and the allergic reaction becomes less prominent. This is evident from the fact that an individual with a very small lesion during the early period of tuberculosis will show a much greater exudative reaction and will be affected to a much greater extent by toxic symptoms than later in the disease when he has many times the area involved and receives many times the amount of tuberculoprotein through reinoculation.

So it seems evident that the allergic reaction is relatively greater in early lesions and that it becomes proportionately less as immunity is established. That immunity and allergic reaction are not identical factors is shown by the work of Swift, who injected hemolytic streptococci intravenously and induced immunity to further injections of virulent streptococci without the cells' becoming sensitized. The same hemolytic streptococci injected subcutaneously produced specific resistance accompanied by cell sensitization.

Dr. Cocke (closing).—The chief purpose of this presentation was to show the internist who rarely has opportunity to follow these cases from start to finish, what happens in not a few cases of extensive tuberculosis where there has been destruction of lung tissue. The cases presented were not altogether exceptional, but occur quite frequently in the practice of any one engaged in treating chronic pulmonary diseases. They emphasize the importance of conservatism in the treatment of tuberculosis. Spontaneous healing of tuberculosis is an established fact, as I trust I have shown.

LIVER ABSCESS*

By J. W. SNYDER, M.D.,
Miami, Fla.

Liver abscess differs in no essential from other forms of suppuration except that the infective agent is often an ameba rather than the usual type of pyogenic bacteria.

ETIOLOGY

Infective organisms may invade the liver by either the portal or the hepatic blood stream; by the bile ducts in association with a suppurative cholangitis; by the lymphatics; by direct extension from other organs or as the result of trauma. The portal circulation is probably the most common route of entry for both bacteria and amebae. An inflammatory process about the appendix is a common source of infected emboli which are swept on to the liver by the portal blood stream. Inflammation about the rectum, in the hemorrhoidal veins, or in fact at any point drained by the portal system may produce a similar condition. Such abscesses tend to be small and multiple, although larger solitary abscesses have been found as the result of this type of infection. Osler has noted that the smaller multiple abscesses are as a rule located within branches of the portal vein, a true suppurative pylephlebitis. If infection takes place by way of the hepatic artery rather than the portal vein, the condition is then secondary to some systemic condition such as pyemia, septicemia, or ulcerative endocarditis, and is but part of the general picture. Extension of an acute suppurative cholangitis into the liver substance with the production of liver abscesses may occur. Liver abscess may also result by direct extension from an infected gallbladder or from a perinephritic abscess or from the perforation of a gastric or duodenal ulcer.

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*Read in Section on Surgery, Southern Medical Association, Twenty-Fourth Annual Meeting, Louisville, Kentucky, November 11-14, 1930.

Typhoid and influenza have been followed by liver abscess. Actinomycosis and tuberculosis each has been the etiologic factor. Wilhelm and Botteli report liver abscess due to the presence of round worms (*Ascaris lumbricoides*) in the bile ducts. In children, trauma is given special etiologic importance. Of 112 cases of hepatic suppuration in children, Legrand ascribes 19 to trauma. Suppuration may also occur in hydatid cyst of the liver.

While the possibilities of bacterial invasion of the liver are many and varied as noted in the foregoing summary, the actual clinical importance of liver abscess due to bacteria is small in comparison with the much greater significance of amebic liver abscess. Liver abscesses due to bacteria tend to be small and multiple. They may be symptomless and unsuspected. The clinical picture is that of the general systemic condition with which they are associated and few signs or symptoms point to the liver itself. While liver involvement may be suspected from local tenderness and slight icterus, the actual diagnosis is usually made at autopsy.

Fortunately not all liver abscesses due to bacteria follow this brief fatal course. Either because of low bacterial virulence, or increased resistance or some other unknown factor, certain of these abscesses pursue a benign course, resulting in solitary abscess formation closely resembling the amebic abscess. Such abscesses are readily cured by surgical drainage, although of course they are not benefited by emetine. Barnes and Pearson report a liver abscess occurring five weeks after acute appendicitis, with drainage and cure. Lindquist reports two cases of liver abscess following gangrenous appendicitis with one recovery after drainage.

The term tropical abscess is a misnomer, as amebic dysentery is no longer to be considered a purely tropical disease. Boech and Stiles, after careful stool examination of a mixed group of 8,029 persons, some of them soldiers who had seen foreign service, found *Entameba histolytica* present in 4.1 per cent. In Chicago among 1,148 food handlers 27 were found harboring *Entameba histolytica* as reported by Williamson, Kaplan and Geiger. In 3,146 English civilians a 3.4 per cent infection was found by Dobell. Dougherty reports 94 deaths from amebic dysentery in 1928, in eleven Southern states. In view of such widespread distribution, all liver abscesses should be considered amebic until proven otherwise. A residence in the tropics should in no sense be considered essential to establish a diagnosis. Brown reports 4 cases of amebic abscess of the liver occurring in residents of the Northern states, all seen during the year 1928. In many amebic abscesses there is no history of dysentery. In 64 cases Thurston found a history of dysentery in 44, while Ludlow reports a 90 per cent incidence.

A tropical climate and the use of alcohol are supposed to be important accessory factors in the development of liver abscess. The white race is particularly susceptible. Ludlow believes vigorous early treatment of amebic dysentery to be the best preventive of subsequent amebic liver abscess.

The formation of a liver abscess may vary from a few days to many years after the occurrence of dysentery. Rogers believes that the latent type of amebic colitis tends to produce a benign type of abscess, while acute gangrenous dysentery may produce multiple small abscesses due to a shower of amebae suddenly released to the liver.

The actual route by which the amebae travel from the intestine to the liver has not been proven. The presence of amebae in the veins of the intestinal wall makes the portal system appear to be the logical route, but as amebae have been reported present in the bile passages, the bile ducts must be considered as possible portals to the liver.

MORBID ANATOMY

About 75 per cent of abscesses are located in the right lobe of the liver. If large, the lower lobe of the right lung may be compressed by upward pressure of the liver, or if adherent to the diaphragm, direct extension through the diaphragm may occur with subsequent rupture into the lung and evacuation of the abscess through a bronchus. Rupture may also occur into the pleura, pericardium, stomach, intestine, vena cava or the general peritoneal cavity. Pyemic abscesses of the liver are multiple and variable in size. Rarely they may coalesce to form a larger abscess. The walls of such an abscess cavity are indurated, friable, and bile-stained. The pus is thin, of normal color or tinged with blood or bile. The liver about the abscess shows an inflammatory leucocytic reaction and the organ as a whole may be of normal size or considerably enlarged. In contrast to such pyemic abscesses, amebic invasion

of the liver is characterized by an early hepatitis without abscess formation. Manson describes such areas of hepatitis in patients dying of amebic dysentery. Later, necrosis and liquefaction occur and a central cavity is formed. Gradual enlargement and extension of the lesion may readily produce an abscess of considerable size. Coalescence of smaller abscesses tends to result in the creation of a large solitary abscess, although more than one abscess may persist. The walls have a ragged appearance, are remarkably free from leucocytic infiltration, and contain motile entamebae. Rogers says that 86 per cent of amebic liver abscesses are sterile. The abscess contents may vary from creamy pus to chocolate colored material due to broken down liver cells or it may be frankly bloody. Lacaze states that amebae are rarely found in the chocolate colored pus, but are numerous in the bloody pus. Amebae are seldom found in freshly aspirated pus obtained at operation, but tend to appear in abundance four or five days later.

SYMPTOMS AND DIAGNOSIS

The symptoms of a pyogenic liver abscess are those of an acute inflammation. At the onset the process tends to be acute, but assumes a more chronic course later on in certain cases. Pain about the liver area with radiation to the shoulder is frequent. Fever of a constant or remittent type with chills, drenching sweats and a rapid emaciation with or without enlargement of the liver presents a characteristic picture. Icterus may be present in a mild degree.

The amebic abscess by contrast tends to be much milder in character. Some abscesses develop entirely without subjective symptoms and the patient may not be aware of any serious difficulty until actual rupture of the abscess occurs. Fever, however, is seldom absent, although often remittent and mild in degree. Profuse sweats are common. Loss in weight and the gradual development of an asthenic state strongly suggests a tuberculous process or the general picture may be that of typhoid. Enlargement of the liver is the most typical symptom, especially in advanced cases. Palpation of the liver below the costal margin frequently discloses a distinct bulging mass in the epigastrium or extension upward may cause elevation of the diaphragm. A sense of fluctuation rarely can be elicited in the protruding portion of liver. Pain about the liver tends to be dull, deeply situated and difficult to localize. Local tenderness to pressure over the liver has been emphasized both for its diagnostic value and as an aid in localizing the seat of the abscess. Leucocytosis may be absent or a count of 30,000 obtained. The higher counts are found commonly with abscesses showing secondary pyogenic infection.

Lacaze calls attention to the many confusing symptoms presented by amebic abscess of the liver. He states that the acute types of abscess require differentiation from typhoid, malaria, undulant fever, endocarditis, meningitis, or yellow fever, while the chronic forms present an even more varied picture. The chronic types, in general, present the picture of tuberculosis with weight loss, night sweats, a cough, pleural effusion and only by a careful exploration of the liver can error be prevented. In another group local symptoms predominate and when acute suggest the congestion of malaria, suppurative hydatid cyst or cholecystitis. Gastric symptoms often predominate with weight loss, epigastric pains, vomiting, melena and an icteric tinge suggestive of ulcer or carcinoma of the stomach. Acute appendicitis may be simulated, and rupture of the abscess into the general peritoneal cavity produces a chain of symptoms suggesting a perforated gastric ulcer or an acute pelvic inflammatory process.

It may be readily understood from the foregoing that the diagnosis of liver abscess is not always easy. Occurrence in a tropical country, where amebic dysentery is prevalent, tends to aid in the diagnosis, but the history of a preceding dysentery, as has been noted, is frequently wanting. Demonstration of amebae in the stools is of course a most important factor, but their absence does not make a negative diagnosis. Manson states:

> "Frequently a correct diagnosis can be arrived at only by repeated and careful study of the case in all its aspects. Golden rules in tropical practice are to think of hepatic abscess in all cases of progressive deterioration of health; and to suspect it in all obscure abdominal cases associated with evening rise of temperature, and this particularly if there be an upward enlargement of or pain in the liver, leucocytosis, and a history of dysentery, not necessarily recent. . . . . Low pneumonia of the right base in a tropical patient should always be regarded with suspicion, for it may mean abscess of the subjacent liver."

To complicate matters it must be remembered that pleural effusion and inflammatory processes in the lower lobe of the right lung are often secondary to liver abscess. Subphrenic abscess may likewise be difficult to differentiate. The position and contour of the diaphragm as shown by the roentgen ray is of aid

in the final decision as to the condition present. It is noteworthy that tropical practice tends to be direct in arriving at a final conclusion as exploratory aspiration of the liver seems to be quite generally advised both for diagnosis and treatment.

PROGNOSIS

The prognosis of pyogenic liver abscess is, generally speaking, very poor. Much depends on whether the abscess is single or multiple. Multiple abscesses are the rule and they are usually fatal, but rarely one may go on to spontaneous cure. Alessandri reports such a recovery following biliary drainage. Single abscesses have a much better prognosis. In such cases surgical drainage is always indicated. Aspiration without drainage is dangerous in the pyogenic abscess because of the risk of peritoneal contamination by seepage.

The prognosis of amebic abscess of the liver depends on many factors, for if efficient treatment is delayed a large amount of the liver may be destroyed and the patient's vitality greatly injured. An alcoholic history, a concurrent dysentery and broken down constitution tend to make the outlook gloomy. Early reports by Rogers gave a mortality of 56.7 per cent in 2,661 cases treated by open operation with drainage. Probably the greatest single factor in improving results was the discovery by Rogers, in 1912, that emetine could be successfully used in the treatment of amebiasis. This specific action fortunately seems to be more definite in hepatic involvement than in colitis and since that time emetine has been the chief factor in both the prevention of hepatic abscess and its cure. More recently arsenicals such as stovarsol and treparsol are also employed with benefit as secondary agents, but not to displace emetine from first place in therapy. It was soon found that many cases of hepatitis could be cured by emetine alone, either before the appearance of suppuration or by effecting its absorption.

At operation the pus aspirated from most liver abscesses was found to be sterile. After drainage, secondary infection often occurred and a septic course occasionally resulted with a fatal outcome. To obviate this danger, aspiration was employed. An attempt was made to empty the abscess at the first aspiration, repeating the procedure only if necessary. In certain large abscesses a drainage tube was introduced into the cavity by means of a trocar and cannula, the end of the tube being immersed in an antiseptic solution with the idea of obviating secondary infection. Others explored the abscess; emptied and closed it without drainage, regarding an amebic liver abscess in the same light as a tuberculous abscess.

These different procedures effected a marked reduction in mortality. Rogers reported a 14.4 per cent mortality following emetine and aspiration. Thurston also reports 14 per cent mortality and states that "The open operation is to all intents and purposes obsolete except under unusual conditions." Ludlow reports 11.1 per cent mortality in 117 cases by open operation and a 2.3 per cent mortality in 43 cases by aspiration. Apparently Ludlow was quite partial to open operation, as his first 100 cases were treated by this method. He states that

> "In certain cases where the existence of an abscess is strongly suspected, we have operated after failure to obtain pus by aspiration and have each time evacuated a large abscess filled with thick pus."

It is interesting to note that subsequently his views changed and with a mortality of but 2.3 per cent in 43 cases he now regards aspiration as the method of choice. The advantages he enumerates are local anesthesia, avoidance of operative shock, less chance of secondary infection, and shortened hospitalization. One hundred and two aspirations were done in 43 cases with no ill effects, although he calls attention to the fact that death may follow the procedure.

In contrast to the foregoing is a report by Lacaze of fourteen years' experience with a total of 252 cases of liver abscess. All cases were treated by open operation after an exploratory puncture with a reported mortality of but 3.1 per cent. He particularly emphasizes the importance of combined medical and surgical treatment, but states that with suppuration already present, the pus must be dealt with according to established surgical procedures.

Aspiration is done outside of the borders of the pleural cavity if possible, but direct approach across the pleural cavity is employed if necessary. Aspiration in several directions is of course advisable if pus is not encountered readily.

Two routes are employed for surgical approach and drainage. They are either the abdominal or the thoracic, or a combination of the two. The choice of course rests with the location of the abscess. A portion of a rib overlying the abscess is resected in the thoracic

approach and the diaphragm is sutured to the chest wall to close off the pleural cavity. The diaphragm is then incised and the liver abscess drained as a primary procedure or a few days later after securing adhesion of the liver to the diaphragm by means of pack or suture. The abdominal approach varies with each operator. As previously noted, some men go so far as to evacuate the abscess and close by primary suture if the pus is reported sterile.

It is indeed difficult to select the preferable method of dealing with liver abscess and I am trusting that the discussion may bring out valuable ideas along this line.

My own thought in the matter is that while aspiration alone is undoubtedly the method of choice for the tropics, with many cases of amebic dysentery and extensive experience in treating such cases, its value is questionable in other localities where amebic dysentery is infrequent and liver abscess rare. Diagnosis under such conditions is difficult and an exploratory operation is a very valuable aid to diagnosis and a means of avoiding unfortunate errors. A fairly common type of case is one in which there is an indefinite swelling in the epigastrium with a doubtful history, and to plunge an aspirator into this swelling on the off chance of its being a liver abscess would be an unsound surgical measure.

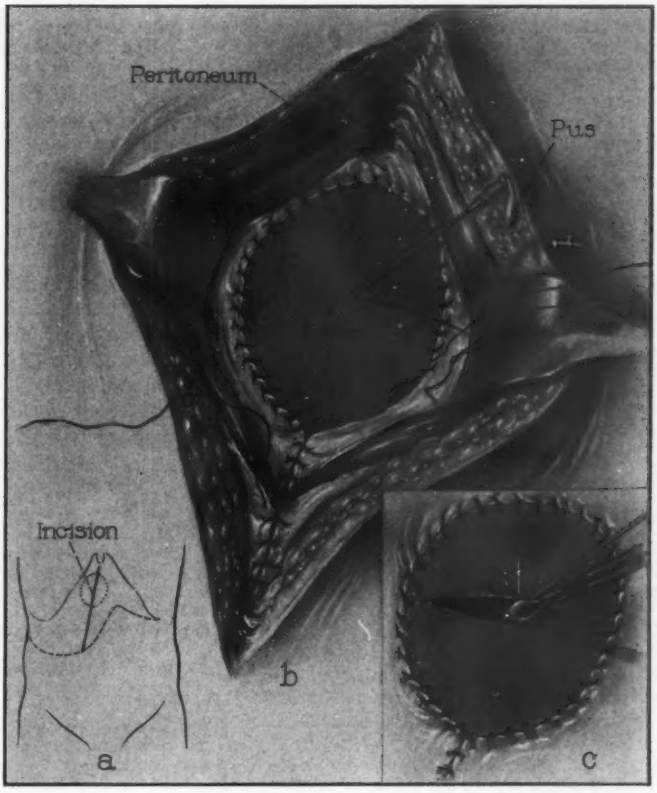

Fig. 1

a, Line of incision; b, Liver exposed in the wound with the peritoneal cavity closed off by suture after a general abdominal exploration has been made; c, Liver abscess located by needle and the needle used as a guide for the cutting cautery in draining the abscess.

I wish to present in the two following cases a method which, while original with me, has been employed in part by various surgeons and which I believe helps to solve the difficulties in this particular type of case.

Mr. R., a resident of Ohio, was operated upon in April, 1927, for appendicitis, the details being somewhat indefinite. Three weeks later he was sent to Florida for convalescence. After his arrival a period of two weeks was spent contending with a gradually increasing septic temperature and dull pain in the right upper abdomen. A palpable tender mass gradually formed in the epigastrium and on May 13, 1927, he was admitted to the Jackson Memorial Hospital. A white count of 13,200 was noted with hemoglobin of 60 per cent and a red count of 3,600,000. The urine showed a trace of albumin. The temperature was 102°. The roentgen ray showed slight elevation of the right diaphragm with clear lung fields.

The diagnostic probabilities as noted on the chart were liver abscess 80 per cent, empyema of the gall-bladder 10 per cent, chronic perforating ulcer 10 per cent.

The next day the following operative procedure was carried out. Under general anesthesia a high diagonal right rectus incision was made and a general abdominal exploration carried out. The duodenum, stomach and gall-bladder were normal and the lower abdomen was negative except for adhesions about the site of the previous appendectomy. The right lobe of the liver was definitely enlarged with a smooth sur-

face and no nodular masses or areas of softening. Filmy adhesions were present between the diaphragm and liver. The abdominal wound was closed in the lower portion approximating the peritoneal and fascial layers. The upper three or four inches of the wound were permitted to gape and the peritoneum was sutured to the surface of the right lobe of the liver as it extended downward below the costal margin. An intestinal suture on a curved needle of the dulox type was employed and it was gratifying to see the lack of trauma caused by the needle and the very accurate closure effected. With the general peritoneal cavity thus closed off and a generous surface of the liver exposed in the bottom of the wound, it was a simple matter to explore the liver in various directions with no fear of peritoneal contamination. Pus was encountered at a depth of two inches. The aspirating needle was left in place as a guide and a tract was opened along its course with the electro-cautery. When the abscess was opened its contents were removed by an abdominal aspirator and about one quart of material was evacuated. The pus itself proved to be sterile and amebae were not found either at this time or on subsequent examinations. A large drainage tube was sutured in place and closure of the wound completed the operation.

Convalescence was uneventful and in three weeks the patient was dismissed with the wound nearly healed. We have continued in doubt as to the exact etiology of this liver abscess. While it apparently followed acute appendicitis, the possibility of an amebic etiology cannot be entirely dismissed even though the organisms were not found.

This plan of operative procedure succeeded so well in the first case that we employed it in a second. The details were briefly as follows:

A colored boy twelve years of age was admitted to the hospital May 11, 1929. He complained of a weakness in the chest and right upper abdominal distress which had been present for one week preceding admission. The temperature was 103°, pulse 100, and respiratory rate 26. Examination showed harsh breath sounds at the base of the right lung with definite fullness and tenderness in the right hypochondrium and flank. The liver was palpable to the level of the umbilicus. The blood examination gave a white count of 20,500 with 72 per cent neutrophils and no malarial parasites present. The urine showed albumin and casts. A Kahn was negative and the stools were negative for amebae. The roentgen ray showed slight elevation of the diaphragm. A tentative diagnosis of either perinephritic or liver abscess was made. Exploratory aspiration about the right kidney region yielded negative findings, leaving liver abscess as the most probable diagnosis. Emetine was then given for a period of seven days, during which time the patient became progressively worse.

On June 21, 1929, the operative procedure previously described was carried out. The abscess was found deep in the posterior portion of the right lobe of the liver. It was found with difficulty because of the depth, but once found by the needle no difficulty was experienced in cauterizing a drainage tract to the abscess cavity. Bleeding was easily controlled by pack and cautery.

The pus obtained was sterile and showed no ameba. Convalescence was uneventful for one week, when some evidence of spasticity of the neck appeared. A spinal puncture done at that time showed a normal spinal fluid. The neck symptoms improved and the temperature approached normal. Two weeks later, symptoms of meningitis became more definite with elevation of temperature and a spinal puncture then showed a cloudy fluid with 5,000 cells, a four plus Pandy but sterile on culture. Death occurred on July 15, 1929. At autopsy the liver abscess was found to be healed and the cause of death was a cerebral abscess which had ruptured into the ventricle.

The ease with which an abscess in the posterior portion of the liver could be drained by an anterior approach, as shown in this case, was quite striking. The real disadvantage was the necessity of burning a long drainage tract through healthy liver. At autopsy, twenty-five days after operation, the abscess cavity and tract were so nearly healed that the liver itself appeared normal, the scar tissue remaining extremely small in amount.

A third case occurred in a native of Wisconsin who was taken ill with chills, fever and sweats while visiting in Florida. For some three weeks he was treated by his physician for malaria fever with no improvement. Pain and soreness developed in the upper abdomen and a mass appeared extending below the ribs on the left. A blood count showed a high leucocytosis. The urine was negative. Exploration of the epigastric mass showed it to be the enlarged left lobe of the liver. A closed hemostat introduced into the left lobe encountered a large abscess close to the surface and this was drained by a tube. It might be noted that this was our first case of liver abscess and the operative technic previously described was not employed. Convalescence was uneventful. Some months later dysentery developed and as amebae were found in the stools we felt reasonably assured of the amebic character of the liver abscess.

The records of the Jackson Memorial Hospital show five additional cases of liver abscess, making a total of eight cases in all during the past four years. Three were probably amebic. One was cured by medical treatment alone; one by open drainage and subsequent medical treatment; and the third died after prolonged drainage with four operations in three years, having received no emetine at any time. Amebae were found in the drainage material of the second case, but not in the third. The diagnosis of the first case rested on clinical evidence alone and prompt response to emetine.

The last two cases were multiple in type, one showing multiple abscesses as part of a general septicemia and the other multiple abscesses of an undetermined etiology. Exploration in the second case resulted in the drainage of three small abscesses with no improvement in the general downward course.

In conclusion may I state that the subject of liver abscess seems to be one somewhat neglected by American authors, and I am hopeful that the discussion will bring out suggestions of value in the treatment of this rather difficult and trying condition.

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DISCUSSION (*Abstract*)

Dr. R. L. Sanders, Memphis, Tenn.—This disease is a most formidable one and unless it is properly treated the death rate is quite high. If all the cases had been reported that have occurred within the boundaries of this Association we could see that the disease is relatively a common one. Given a case of chronic illness that is progressive, with a pain about the liver region and a continuous elevation of temperature, Dr. Snyder has told us to consider a liver abscess.

I shall confine my remarks to the solitary or amebic abscess, as indicated by the essayist's title. The prognosis should be good if the disease is attacked before too much damage has been done in the liver and while the patient is yet in a fairly good physical condition.

Under the head of treatment Dr. Snyder has mentioned aspiration, the transthoracic and the abdominal avenues of approach.

The satisfactory results obtained by repeated aspiration are at least encouraging. I have had no experience with this treatment. I have always been a little afraid of infecting clean tissues by withdrawing a soiled needle. However, if the diagnosis can be definitely established and one has an assurance that the pus is sterile I can see the rationale of the procedure, provided of course the needle is of sufficient caliber to withdraw the thick fluid.

On account of the possibility of postoperative hernia, intraabdominal adhesions and a longer period of disability, I have usually chosen the transthoracic instead of the abdominal route of approach. Most large abscesses are situated in the right lobe and near the dome of the liver and can readily be reached through the lower thorax. The operation can be done in one or two stages according to the indications. I have had only one case that was drained through the abdomen. The large abscess was opened just above the gall-bladder and it was drained through the upper angle of a right rectal incision. The patient made a complete recovery, but he was in bed quite a while on account of the drained abdominal wound. Several months later he developed a second abscess in the dome of the liver and it was drained through the thorax. The second recovery was much more prompt and satisfactory than the first.

We have operated upon six other cases of solitary abscess. All of them ran a chronic course as was outlined by Dr. Snyder. In all the cases the diaphragm was high on the right and the transpleural approach was easy. In all but two cases adhesions had sealed the pleura and a one-stage operation was done. All recovered. Amebae were not found in any of our cases. Emetine was used to supplement the surgical drainage. In the early days we used a weak solution of quinine to irrigate the wound, but it was of doubtful value.

The x-ray has been of considerable value as an aid in the diagnosis of our cases. We have been able to visualize a high point in the dome of the diaphragm corresponding to the maximum bulge of the abscess.

Much study and experimental work are now being carried on to elucidate the physiology of the liver. This is very commendable and should continue. On the other hand, it is probable that pathological conditions such as the one brought out today by Dr. Snyder are not kept so constantly before our minds and in our thinking as they should be.

Dr. J. S. Turberville, Century, Fla.—I wish to stress a few points in Dr. Snyder's paper: first, doming of the diaphragm, mentioned by Dr. Sanders; second, loss of weight; third, obscure pain and tenderness high in the upper abdomen. It is surprising to find how large an abscess a man can have and yet how little definite tenderness the physician can make out.

We should not think of amebic abscesses always as being single. I remember one case upon which I operated three times. This showed amebae in the walls of the abscess. He was operated upon the first time in the abdomen and twice from the thorax. He is still living. This was twenty years ago. Pyogenic abscesses are not always multiple. I have seen single pyogenic abscesses. I believe the high mortality from operating upon liver abscesses is due to overlooking additional abscesses.

The technic which Dr. Snyder describes cannot be used for an abscess high under the diaphragm, or high under the liver. Adhesion of the omentum to the surface of the liver indicates proximity of the abscess.

Dr. Frank K. Boland, Atlanta, Ga.—I should like to put on record a small series of cases in order to show

the instance of this disease, also to corroborate the figures given us by Dr. Snyder.

Among 39,000 admissions to the Emory University Hospital for colored patients there have been in the last nine years 15 cases of liver abscesses, 13 in men and 2 in women. Of these 15 cases, 9 were amebic and solitary abscesses, and six were multiple abscesses. Of the 9 amebic cases, the ameba was demonstrated in all stools except two. The total mortality rate was 45 per cent. There were two deaths in the solitary abscesses and five deaths in the multiple abscesses.

It is interesting that while amebae may not be demonstrated in the stools they can be demonstrated in the scraping from the abscess walls, which we did, I think, in every case in which we found amebae.

Of 9 amebic cases among negroes, none had ever been out of the State of Georgia. This certainly is a disease of the temperate zone, as well as the torrid zone.

Dr. Snyder (*closing*).—In a liver abscess which shows on abdominal examination a definitely enlarged palpable liver, the procedure I have described should work out very well. The abscess can be drained with a minimum of spilling and no peritoneal contamination. Healing is rapid and real difficulty may be met in trying to maintain drainage for an adequate period.

TYPES OF BACTERIAL DYSENTERY IN THE SOUTH: A CLINICAL AND BACTERIOLOGICAL STUDY*†

By DANIEL N. SILVERMAN, M.D.,
and
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Within the past few years occasional reports on the occurrence of bacillary dysentery in sporadic form have emanated from certain sections of the Southern states. There have been few epidemic outbreaks recorded in these same communities, a testimonial of the improved hygiene and the sanitary methods of food handling and sewage disposal. Having encountered in the gulf section of the South an appreciable number of dysenteries, suspected of being bacterial in their origin, we decided to make a clinical and bacteriological survey of the situation.

An idea of the localities from which bacillary dysentery has been reported may be gained by a brief reference to the work of other Southern investigators. In 1921, Boyd[1] was impressed by the fact that bacillary dysentery is often overlooked, and made a plea for concerted effort in recognizing these cases. He believed that cases presenting dysenteric symptoms were usually considered of protozoan origin. This writer was a pioneer in America in calling attention to the importance of sporadic cases of bacillary dysentery. He reported two such instances in Texas. His cases were caused by the Hiss-Y and the Flexner-Harris bacilli, respectively. No Shiga bacilli were found. Of interest was an individual carrier of the Flexner bacillus. The status of the dysentery carrier is one that concerns the clinician and the authors are of the opinion that this is the source of infection for several of their cases.

The second report of a series of bacillary dysentery cases was made by one of us (D. N. S.)[2] in 1925, when several cases were found to have developed in Louisiana. Their nature was mostly of the chronic form and the offending bacilli were found to be of two types, Shiga and Flexner. Several additional cases, in their acute and chronic stages, due to the same organisms were studied and reported in the early part of the present year (1930).[3] We believe that the disease is on the increase and appears to be more prevalent than the amebic type of dysentery. It is certain that bacillary dysentery is endemic in the South. This opinion is concurred in by a Virginia investigator,[4] who in 1928 stated that epidemics of bacillary dysentery occur in the mountainous sections of Virginia in severe form. He reported a series of six cases, two in children, and believes the disease is apparently on the increase in that State.

Several years ago came a report of an exceptional instance of bacillary dysentery arising in Virginia.[5] The blood culture was positive for dysentery bacilli of the Flexner type. Five days later the bacilli disappeared from the blood, but the agglutination test was positive for Flexner bacilli in dilution up to 1-400. This case was treated several weeks without results. The organism was never found in the feces.

Since our last report on bacillary dysentery, which included acute and chronic cases with the Flexner and Shiga bacilli, we have investigated a series of different types of bacterial dysenteries, including some unusual varieties, noting especially their clinical findings, the bacteriology of the feces, serology and results of treatment. Among this group of cases we had the opportunity to encounter certain of the rarer dysenteries such as Duval bacillus infection, streptocccal dysentery, *Bacillus enteriditis* infec-

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†From the Department of Medicine, Pathology and Bacteriology, School of Medicine, Tulane University of Louisiana.

tion producing a chronic dysenteric syndrome, *B. pyocyaneus* involvement of the bowel and another most interesting colitis produced by a coccoid-bacillus which was also the cause of a complicating cystitis.

DIAGNOSIS

It is not difficult to diagnose an acute bacterial dysentery, which is usually of the bacillary type, when an individual suddenly becomes ill with abdominal pains, a rise in temperature and a diarrhea characterized by bloody mucous stools that show the presence of pus and the absence of amebae on microscopic examination. On the other hand, there is some difficulty in recognizing a low grade bacillary infection that may or may not have been ushered in by acute symptoms. The chronic case may have only occasional diarrhea and even be possessed of alternating constipation. The stools are soft to a watery consistency containing mucus and perhaps some blood. Infection with the Flexner bacillus is usually mild, even in the acute stage, and, should the case become chronic, the symptoms may be giving very little discomfort. This is the type of infection more frequently seen in temperate climes and therefore concerns us the most. Acute infection with the Shiga bacillus is an intense affair, sometimes observed in temperate climes, but usually met with in the tropics. The stools may number fifteen to twenty-five per diem, even in mild cases, and there is considerable rectal tenesmus.

The presence of pus cells as well as endothelial cells in a stained smear of material from a bacillary dysentery stool is in itself a valuable differentiation from the amebic which shows very few, if any, pus cells.

Stitt describes the smear from bacillary dysentery as 75 per cent polymorphonuclears showing signs of degeneration, but at times the smear may show these cells simulating a fresh pus smear.

On physical examination varying degrees of tenderness are elicited over the cecum and pelvic colon. The use of the proctoscope is an aid in diagnosis and a valuable method for determining the progress of the lower intestinal pathology during treatment. An acute case of bacillary dysentery shows a rectal mucous membrane which is extensively but superficially ulcerated. These ulcers are seen to bleed and the surrounding mucous membrane is highly inflamed and presents a granular appearance. In the chronic case, the mucous membrane may show no ulcers, but there is a granulation tissue replacement and considerable hyperemia. In acute cases, the patient complains of considerable pain on the passage of the instrument and Manson-Bahr[6] is of the opinion that this sign is diagnostic of bacillary dysentery in contrast to amebic ulceration, which is almost entirely non-sensitive.

The blood serum agglutination test is probably the most convenient and simple method for an accurate diagnosis of bacillary dysentery. Even in the best equipped laboratories of bacteriology it is sometimes difficult to isolate the offending microorganisms, especially in the chronic cases. It is necessary, therefore, to place reliance on the agglutination reaction. However, this reaction will bear more or less significance dependent upon the dilution of the serum when a certain one or more of the bacilli of dysentery are agglutinated. For example, with the Shiga infection it is considered diagnostic if the patient's blood serum agglutinates that organism in such low dilution as 1-50. On the other hand, with the Flexner bacillus one should obtain a positive test with serum that is diluted up to 1-100. Within the first few days of an acute bacillary dysentery there is a gradual development of the agglutins in the blood as demonstrated by the following case:

A.W.B., male, age 23, was taken suddenly ill one week before admission to the hospital. The initial symptoms were abdominal cramps, but there was no change in the number or character of the stools for two days. The pain persisted, somewhat relieved by an evacuation. On the third day of his illness, the bowel movements became frequent, watery in consistency and accompanied by much tenesmus. This was soon followed by stools containing mucus, pus and streaks of blood. On admission to the hospital, the patient's temperature was 100°, followed by a chill and leucocytosis of 12,000 with 82 per cent neutrophils. The proctoscopic examination showed numerous superficial rectal ulcers with generalized inflammatory reaction of the mucous membrane. At this time, seven days after onset, the serum agglutination was of doubtful diagnostic value because it was weakly positive in dilution of 1-60. On the following day, however, a strongly positive reaction was seen in the same dilution (1-60).

The delay in development of the blood agglutination reaction is not always present and a positive test is sometimes observed almost at the outset of acute symptoms.

Such was the case in a man, 45 years of age, who was awakened one night with severe abdominal cramps, followed the next day by a bloody mucous diarrhea and a rise in temperature to 102°. The same afternoon his blood serum was strongly positive for Shiga bacil-

lus agglutination in 1-40 dilution. After a severe illness of ten days' duration, the condition gradually cleared. Such a result with the agglutination test justifies its employment at an early stage of the disease in an effort to make a diagnosis.

In the chronic state of bacillary dysentery, the agglutination test is of inestimable diagnostic value as a corollary to the clinical symptoms and proctoscopic findings. In a series of 50 cases suspected of being chronic bacterial dysentery by one of us (D. N. S.), the agglutination test was positive for bacillary infection in 80 per cent. In the other 20 per cent there were several unusual bacterial types of dysentery and several showing a negative reaction for the stock cultures of *B. dysenteriae,* but positive reactions against the particular bacillus isolated from the patient's stool. In 1925, Lacy[7] studied a series of 45 strains of dysentery bacilli similar to and identical with Shiga bacillus. This author found from the serum tests that 27 strains formed one group which corresponded to typical Shiga, nine formed a second group different from the first and nine others formed a group agglutinated only by their homologous sera. In one of our own cases of chronic Shiga dysentery, the serum reacted against the particular bacillus isolated from the patient's stool, but not against the stock culture. This case will be discussed more in detail under the heading of treatment because of the excellent clinical and bacteriological results acquired through the use of autogenous vaccine.

The auto-agglutination of the pathogenic organism isolated from the patient's stool is diagnostic of certain types of bacterial dysentery other than the bacillary forms. These rarer forms of bacterial dysentery already mentioned above will form the subject matter for a subsequent discussion. As a reminder of the presence of such cases in the South, a brief summary of the findings in some of them may be timely.

In the instance of a streptococcal dysentery of a chronic nature, a pure culture of streptococci was recovered from the stool of a child who had a history of acute bacillary dysentery followed by chronic diarrhea with mucus, pus and blood in the stools. Her blood serum completely agglutinated this streptococcus in dilutions up to 1-320. After six months of vaccine therapy, there was considerable improvement in the clinical symptoms and the streptococci were found in fewer colonies, having become attenuated and allowing for the ingress of the bacteria found normally in the intestinal tract. In still another very rare case of dysentery, a woman had been having diarrhea for seven years; the diarrhea came in periods, associated with frequent elevation in the evening temperature. Of considerable clinical and bacteriological moment was the fact that the patient developed bladder symptoms only recently, which had been labeled colon bacillus cystitis. From the stools a streptobacillus was isolated and her blood serum agglutinated this organism in dilution 1-80. Then a catheterized specimen of urine revealed the same coccoid bacillus and the patient's serum also agglutinated this bacillus in the same manner. This is the only case of dysentery in our series that developed a complicating cystitis due to the identical microorganism. A urinary infection does not complicate cases of *B. dysenteriae.*

TREATMENT

The handling of a case of bacterial dysentery will depend on whether the case is acute or chronic and to a lesser extent upon the type of infection one is dealing with. In all acute cases, complete rest in bed is essential until all symptoms have subsided, while in the chronic stage ambulatory treatment is quite often effective.

With reference to bacillary dysentery, which forms the greater number of bacterial dysenteries, the Shiga organism is more virulent and produces more violent symptoms, but it is more amenable to serum treatment. The polyvalent antidysenteric sera should be given intravenously every day in doses of 60 to 80 c. c. for the first four days and then in accordance with the severity of the symptoms (Graham).

In the acute cases, an initial dose of castor oil will expel the retained feces and allow for elimination of the inflammatory exudate. Some authorities favor the regular administration of a daily saline for the same purpose.

Specific bacteriophage has been used with excellent results by d'Herelle and others. Up to the present time, however, treatment with this substance is impractical because of the difficulty of obtaining the specific bacteriophage in sufficient quantity to combat an infection with bacilli of dysentery.

In the chronic cases, which have constituted the majority of our cases of bacterial dysenteries, we wish to call attention to the satisfactory results obtained by the subcutaneous injections of vaccine. The best results in vaccine therapy were shown in the bacillary form of dysentery, especially the Duval type. Three cases of this type were cured by a vaccine which had been made with the stock strain that was agglutinated by the patient's serum. It has been found in our section of the country that the bacillus isolated from such cases of dysentery is the identical organism isolated by Duval in 1904. In other words, we have reference to the organism described as a lactose fermenter.

The technic of administration and the excellent results obtained by the vaccine is best illustrated by the description of a typical case:

Miss C., age 30, complaining of abdominal pains with a frequency of bowel movements day and night, from four to eight stools per diem, was referred by Dr. William Barker, of Plaquemine, La., on August 5, 1930. The patient's temperature showed an evening rise to 99 or 100° every afternoon.

The proctoscopic examination showed no visible lesions in the rectum or sigmoid. The stool contained mucus and pus cells.

The blood serum of the patient agglutinated the Duval bacillus in dilution 1-80 and was negative for the other strains of *B. dysenteriae*. The gastric analysis showed an absence of hydrochloric acid after the Ewald test breakfast, by the fractional method. For two weeks the treatment consisted of hydrochloric acid, non-residue diet, and acidophilus bacillus therapy. There was no improvement. A vaccine made from Duval strain in concentration of 2 billion per c. c. was administered subcutaneously as follows: for two weeks, from September 16 to 30, a dose was given every other day, starting with 0.25 c. c. and increasing to 1 c. c. From October 2 to 31, 1 c. c. was administered every three days. Following the third dose of vaccine (September 20) the bowels moved once a day only and have continued regular. There was no further abdominal pain following the fifth dose of vaccine.

Another very striking example of clinical and bacteriological improvement with vaccine therapy was the case of a physician who had been ill for about two years. He had been treated symptomatically with varied diets and drugs for attacks of abdominal pains and diarrhea.

The blood serum failed to agglutinate any of the stock cultures of *B. dysenteriae*. However, the case was clinically suggestive of bacillary dysentery and the stool was cultured with positive results, a strain of the Shiga bacillus being isolated. The patient's serum was then tested against this organism and was found to be strongly positive (complete agglutination in dilution 1-140). An autogenous vaccine made from the isolated *B. dysenteriae* was administered in much the same manner as in the case of Duval dysentery. Within a comparatively short period (two weeks) the diarrhea ceased and has not returned during the past six months. After five months of vaccine therapy the previously prevalent Shiga bacillus has disappeared entirely from the stool and the doctor is practically well.

The above case emphasizes the necessity for thorough investigation before discarding the diagnosis of bacillary dysentery. The agglutination test may be negative for the ordinary laboratory strains but, as shown by the studies of Lacy, there was a series of 45 strains of dysentery bacilli similar to and identical with the Shiga bacillus.

SUMMARY

Bacillary dysentery in specific form is not of uncommon occurrence in the Southern states. In fact, the disease is endemic and appears to be increasing in frequency.

Several types of bacillary dysentery have been recognized in this area, but principally the Shiga, Flexner and Duval are observed. The most satisfactory means of treating the chronic cases seems to rely on vaccine therapy.

Unusual types of bacterial dysenteries, namely, streptococcal, a bacillus not any one of the *B. dysenteriae* and *Bacillus enteriditis* were encountered in this investigation. It is our opinion that these unusual forms may be secondary to true dysentery.

The authors wish to express their appreciation to Drs. Harris and Friedrichs of the Department of Pathology and Bacteriology, Tulane University, for valuable assistance rendered in these investigations.

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Discussion follows paper of Dr. Witherspoon, page 514.

CHRONIC ULCERATIVE COLITIS: VACCINE THERAPY IN SIXTY-SIX CASES*

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Concerning colitis, or speaking more broadly, concerning the irritable colon, much remains to be investigated and explained. But a very definite and valuable contribution to our knowledge of the etiology of chronic ulcerative colitis has been made in recent years by Dr. J. A. Bargen and his co-workers at the Mayo Clinic, and the subject is appearing more often now in medical literature. It is the purpose of this paper to make a practical estimate of our present knowledge of chronic ulcerative colitis and to report

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on 66 cases in which autogenous vaccine therapy has been instituted.

ETIOLOGY

For years one of the most discouraging cases a physician could encounter was one of chronic ulcerative colitis where the "toilet-stricken" patient usually exhibited progressively depleting chronic invalidism and declining morale, despite the most varied and heroic treatment. The cause of the malady was long a matter of conjecture: disturbed metabolism, *B. coli*, various kinds of streptococci, enterococci, and dysentery bacilli, all have been considered. The clinical symptoms, gross pathology, proctoscopic and roentgenologic findings were accurately described long before a definite bacterial etiology was established.

Beginning in 1923, Bargen, at the Mayo Clinic, following methods of Rosenow, has carried on a very painstaking and successful investigation by which he has established beyond any reasonable doubt a specific bacterial cause for the disease in question. Bargen gives a most comprehensive summary of his work in the *Archives of Internal Medicine* for April, 1930.

In brief, Bargen repeatedly isolated from cultures of the bowel mucosa of patients with chronic ulcerative colitis, a diplostreptococcus of definite morphologic, cultural and serologic characteristics. Bargen thinks that the organism probably belongs to the streptococcus group and the viridans species. Intravenous injections of fresh cultures into rabbits and dogs produced clinical diarrhea and colonic ulcers, from which the causative organisms were in turn isolated. Autogenous vaccines were prepared and used, and clinical improvement was noted. Then immune serum was made, for diagnostic and therapeutic purposes. Some investigators, among whom is Paulson of Baltimore, still insist that Bargen's diplostreptococcus is not specific, but clinical results in several hundred cases at the Mayo Clinic certainly substantiate Bargen's claims. In the past two years Horgan and Horgan, Fradkin and Gray, Chisholm, Greenbaum, and Kraacke have reported favorable results with autogenous vaccines, and Soper and others have accepted the diplostreptococcus as the causative agent. My associate, Dr. H. G. Walcott, and I report in this paper our results in 66 cases in which autogenous vaccines were used or are being used.

My own opinion is that the work and clinical results of Bargen and others as reported throughout the United States, and our personal experience, sufficiently establish the diplostreptococcus as the causative organism; and therefore it is the duty of the physician to make every effort to use specific vaccine therapy, with the common sense addition of dietary and symptomatic measures. It is only reasonable to grant that occasionally there may be found a colitis with actual ulceration, closely simulating the clinical entity herein described as chronic ulcerative colitis, where local conditions in the colon have enabled *B. coli*, or various streptococci or enterococci to become pathogenic. But even in such cases autogenous vaccines should be of value.

CLINICAL SIGNS AND SYMPTOMS

Clinically, the disease exhibits what would be expected of a colon at first made hypersensitive by an active inflammation and later impaired in function by scarring and contraction, namely: a diarrhea which may be continuous or intermittent, with blood, pus and mucus in the stools; often alternating with constipation, with scybalous stools. Abdominal griping, nervous instability, loss of weight and a progressive hopelessness on the part of the patient are frequently found. The disease is also characterized by remissions and recurrences, a fact that should be borne in mind in evaluating the efficacy of treatment.

Physical examination usually shows a definite tenderness over the descending colon and sigmoid, perhaps a generalized abdominal tenderness. A scaphoid abdomen, with cachexia, are common findings, but it is possible for the patient to be in apparent good health. Physical examination should include a systematic search for possible foci of infection, such as diseased tonsils, teeth, sinuses, or prostate.

Several warm stools should be examined to eliminate a possible amebiasis or flagellate infection. Bargen reports about 5 per cent of such co-existing infections.

Roentgenologically, a barium meal gives little definite evidence other than a rapidly emptying colon. The barium enema, however, gives very typical pictures: in the early stages, a highly spastic bowel; later, a narrow, rigid, pipe-like colon which fills rapidly, with shallow or absent haustral markings, perhaps interspersed with deep contractions. Often the colon appears to be noticeably shortened. Deep, pene-

trating ulcers, while rare, may give a "feathery" appearance. The disease usually begins in the rectum and sigmoid, but Bargen and Weber have aptly called attention to the fact that more proximal segments of the colon may show x-ray evidence of an ulcerative colitis, the "regional migratory type," as they call it.

Proctoscopic examination probably gives the most important data in diagnosis. And the pathology of the disease is best described by the appearance of the rectum and sigmoid in the four phases of the active period of the disease, namely: hyperemia, edema, miliary abscesses, and miliary ulcers, a syndrome not easily confused with that of any other known lesions of these structures. And in the more chronic types, or in the stage of remission or healing, the glazed, contracted, scarred and pitted mucosa is typical. Granular ulcerations, pitted scars, with diffuse or universal involvement, and contraction of the lumen of the bowel are pathognomonic signs. As Buie has aptly described the condition, "myriads of miliary abscesses and ulcers pepper the highly inflamed wall of the bowel."

BACTERIOLOGY

The diagnosis is clinched and the predicate laid for specific vaccine therapy by culturing some of the ulcers through the proctoscope and isolating the causative so-called "Bargen's organism," which is a diplostreptococcus of definite morphologic, cultural and biologic properties. The scope of this paper does not permit a technical discussion of the bacteriology involved. In brief, we follow as closely as possible the technic used by Dr. Bargen in his own laboratory.

Dr. Bargen developed autogenous vaccines, then bacterial filtrates, and ultimately, with the aid of Rosenow, an immune serum from horses, for diagnostic and therapeutic purposes. The immune serum is of special value in acute, fulminating cases, but so far as I know, is obtainable only at the Mayo Clinic. In a recent personal communication, Dr. Bargen states that some of the large biological houses of the country are working on plans now to make the immune serum universally available. We have been using autogenous vaccines only.

The important part that distant foci of infection probably play will be mentioned here, because numerous investigators have reported the isolation of the typical organism from diseased teeth or tonsils removed from patients with chronic ulcerative colitis. In two of our cases, purulent drainage from sinuses exhibited apparently the same diplostreptococcus found in culture of the colon ulcers; another case showed a prostatic infection with the same organism. The exact pathogenesis of the disease remains somewhat indefinite. Predisposing factors are probably upper respiratory infections, overwork, general debility, and former bowel infections. We have had two cases which were apparently sequelae of amebiasis.

DIFFERENTIAL DIAGNOSIS

As noted in the chart, the differential diagnosis of chronic ulcerative colitis may be summarized by saying that no other colon lesions give a similar proctoscopic picture, nor yield the characteristic causative organism on direct culture. While amebiasis typically shows larger, more irregularly scattered ulcers, with active or encysted amebae in warm stool preparations, yet attention is called to the fact that some cases of colitis of long standing may be cleared up by the empiric use of emetine, stovarsol or treparsol. It is true that arsenical compounds should be used cautiously in real chronic ulcerative colitis, but a safe and excellent therapeutic test is to note the effect of a daily dose of one grain of emetine for three days.

The simple chart is intended to emphasize differential diagnosis for several reasons. The key to successful treatment is a correct diagnosis. It is felt that many physicians daily allow cases to go along as unclassified colitis when, by making use of fairly simple means at their disposal, they could easily make correct diagnoses. If a physician is not prepared to make the proper bacteriological study and subsequent vaccine, he can then best serve his patient by referring him to one who is prepared. The proctoscope should not be used indiscriminately, but every physician can easily learn by a little study to use one intelligently. And the chart is given to remind us gastro-enterologists that in the enthusiastic welcome of a new addition to our armamentarium we must realize that comparatively few of the cases of irritable colon we encounter are of the chronic ulcerative type.

Serious complications and sequelae of the disease under discussion include: perforation with local or generalized peritonitis, occasionally superimposed neoplasms (one case of each has occurred in our experience), polyposis, rectal stricture, perirectal abscess or fistula, arthritis, hemorrhage, secondary anemia, pellagra, splenomegaly, mesenteric thrombosis, or endocarditis.

DIFFERENTIAL DIAGNOSIS IN CHRONIC ULCERATIVE COLITIS

	CHRONIC ULCERATIVE COLITIS	AMEBIASIS	BACILLARY DYSENTERY	TUBERCULOUS ENTERO-COLITIS	MALIGNANCY OF COLON
ONSET	Insidious or sudden	Usually sudden	Usually violent	Slow, subsequent to t. b. elsewhere	Insidious
COURSE	Protracted—remissions common	Chronic, with relapses	Few weeks only, usually	Progressively worse	Few months
PHYSICAL EXAMINATION	Left colon tender; scaphoid abdomen	Nothing pathognomonic	Patient acutely ill	Evidence of t. b. elsewhere	Palpable mass (?)
STOOL EXAMINATION	Blood, pus, mucus; no parasites	Entameba histolytica	Many leucocytes	Usually no blood or pus	Blood—no parasites
PROCTOSCOPIC APPEARANCE	Diffuse miliary abscesses and ulcers; bleeds easily	Discrete "punched out" ulcers, with normal mucosa between	Scattered shallow ulcers, with ragged edges	Mucosa of lower colon usually normal	Tumor may be visible
CULTURE	Bargen's diplostreptococcus	No specific bacteria	B. dysenteriae	Acid-fast B. tuberculosis	No specific bacteria
BARIUM ENEMA	Shortened, rigid "pipe-like" colon; pathology distad	Proximal involvement; colon not rigid	Patient often too sick to permit	Ileo-cecal "feathering" or filling defect	Localized filling defect
SEROLOGY	Diag. serum of value, but rarely obtainable	Negative	Positive; specific agglutination	Negative	Negative

DIVERTICULITIS: no blood; no ulcers; x-ray shows diverticula; non-specific bacteriology.
MUCOUS or CHRONIC CATARRHAL COLITIS: no blood; no ulcers; non-specific bacteriology.
GASTROGENOUS DIARRHEA: no blood; no ulcers; absence of free HCl in stomach.
SYPHILITIC COLITIS: very rare; specific serology.
SUMMARY: Chronic ulcerative colitis presents a proctoscopic appearance all its own, with a definite causative organism, and fairly characteristic x-ray findings.

THERAPEUTICS

In the light of the present knowledge of this disease, intelligent treatment should be directed toward immunization against the causative organism, supporting the patient meanwhile by general systemic measures while the comparatively slow process of immunization is under way. We administer the autogenous vaccine subcutaneously on alternate days in increasing doses from 0.05 to 1.0 or 1.5 c. c., being guided by the patient's reaction. The maximum dose is maintained at weekly intervals for from two to three months. More than one course of vaccine is usually best, with a rest period of two or three months.

Diet, in the acute case, should be of high caloric value, increasing as rapidly as possible to that of the chronic case, namely, a high calory, high vitamin, relatively low-residue diet, as suggested by Larimore. The patient should be required to take plenty of nourishment.

The third factor in treatment has already been mentioned: a systematic search for, and elimination of, all foci of infection.

Mental hygiene is a most essential element in treatment. The patient with chronic ulcerative colitis, usually of several months' duration, needs considerable boosting of his morale. Except in the acute cases, rest in bed should be abandoned for plenty of fresh air, sunshine, and mental diversion.

For temporary relief bismuth, kaolin, the opiates and the astringents may be used. Medicated enemas may be of value. Mercurochrome tablets or arsenic by mouth with caution, preferably as treparsol, often aid. Tincture of iodine, ten minims in water three times daily, has been advocated.

Complications should be handled symptomatically. Surgery rarely becomes necessary, if proper treatment is started early enough, and indeed the diseased colon constitutes a very poor surgical risk. Occasionally when the patient continues on the down grade despite all medical measures, a cecostomy, appendicostomy or ileostomy may be done to save life. Colectomy has been done with a frightful mortality.

REPORT OF CASES

Dr. Walcott and I wish to report 66 cases in which we have made diagnoses of chronic ulcerative colitis in the past two years and instituted autogenous vaccine therapy. Obviously because of the comparatively short period of

time, we must be modest in any claims for permanent results.

Of the group, thirteen attained marked clinical improvement to the point of being apparently well. Twenty-one showed very satisfactory improvement on vaccine, but have had recurrences, with subsequent positive cultures and more vaccine. As has already been mentioned, however, it is frequently necessary to maintain treatment over several months. Ten patients have exhibited marked improvement, but are on their first course of vaccine. Eight have been on treatment too short a time for consideration. On five we have been unable to secure reports of progress. Six patients have showed very little improvement, but in practically every case there are other factors, such as heart disease or sinusitis, refractory to treatment. One patient improved for a month on vaccine therapy, then developed a perforation with peritonitis and death. Another patient developed a definite malignancy of the colon four months after treatment was instituted. One patient failed to show any marked improvement. She has since consulted another internist and the report comes back that dietary measures have relieved her trouble. Two patients seen in consultation by us died before a vaccine could be prepared.

Of the 66 patients, 40 were females. The ages of the entire group ranged from 10 to 74 years.

Dr. J. S. Sweeney and Dr. B. R. Buford, internists who use the same laboratories that we do, report cases as follows: of seven patients, Dr. Sweeney rates three as making 100 per cent improvement, one 75 per cent, one 50 per cent (which patient had had a colitis for 15 years), and two with only recent beginning of vaccine. Dr. Buford reports three cases: one 100 per cent, one 75 per cent, and one patient would not follow vaccine therapy.

CONCLUSIONS

(1) Chronic ulcerative colitis is a specific infectious disease, with the diplostreptococcus described by Bargen as the causative organism.

(2) Autogenous vaccine therapy has brought clinical improvement, as reported by numerous clinicians.

(3) Differential diagnosis is stressed so that more cases may be correctly diagnosed by the simple aids of stool examinations, proctoscopic observation, culture of the colon mucosa, and barium enema findings.

(4) Sixty-six cases are reported by the author and associate, with 10 other cases from Dallas internists.

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Discussion follows paper of Dr. Witherspoon, page 514.

SPASTIC COLON*

By JACK WITHERSPOON, M.D.,
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The spastic colon has become a familiar entity. It has been blamed for many symptoms and has been the subject of much discussion in the medical literature. This paper will attempt to review the causes, the functional pathology, and the symptoms, and present a plan of treatment of this disorder.

Of all the disorders of the gastrointestinal tract, those of the large bowel are the most common, and constipation is most frequently seen.

The x-ray has had a large place in the study of diseases of the colon. Until recently constipation was classified as atonic and hypertonic, but with the use of the opaque meal and opaque enema we have come to know that constipation, due to relaxation of the colon tube, is rarely seen. (Dr. Larimore thinks left-sided redundancy and relaxation are still the com-

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monest causes of constipation.) On the other hand, hypertonic or spastic change is blamed for most of the tardy movement of the bowel contents.

Spastic change of the colon has been found as a complication of certain organic diseases of the bowel wall. Cancer of the ileac colon, cancer of the rectum, hemorrhoids and *fissura in ano*, diverticulitis and gross ulcers of the bowel have been associated with contracted bowel. Cholecystitis, urinary calculus, disease of female pelvic organs and other adjacent inflammations cause spastic colon.

Functional spastic colon has, however, certain characteristics. It is three times more common in women than men. A large series of infant colons were studied by x-ray, by Larimore, and he shows that a congenital type of left-sided narrowing and right-sided dilatation is associated with constipation. Other groups studied show that this disease is most common in middle life, at about the age of thirty-nine.

Associated with mucous colitis, it is seen only in hypersensitive, nervous introspective people. It is a disease of the neurasthenic. Eggleston has pointed out this association again in a recent paper.

We should have a clear idea of the physiology and function of the colon to understand the significance of the symptoms and functional pathology of the disease. When a meal leaves the stomach it has been reduced to a semi-fluid state. It had been held up by the pyloric mechanism for several hours, but after about three to four hours it passes rapidly through the small intestine to be held up slightly at the ileocecal valve.

In diarrheic states, pediatricians know that the taking of food is immediately followed by a rush through the small intestines, and without hesitation at the ileocecal valve the mass proceeds with unabated rapidity through the colon and presents itself at the rectum with a demand for defecation. Normally, because of the lower gradient in the colon, and because of the obstruction at the valve, there is an accumulation at the ileocecal junction and the meal enters the cecum still in a fluid state, but in a more orderly manner.

The cecum and that part of the right colon proximal to the ceco-colic junction retain the food for hours. The waves of motion are not always caudal. Reverse peristalsis can frequently be observed, and only in inflammatory disease of the cecum do we find the cecum empty after meals. The condensor action of the large bowel occurs in the transverse and descending colon. It is here that fluids are extracted and the contents become a semi-fluid mass. The usual peristalsis is not observed, but the mass progresses, like freight cars pushed along a side track, in mass movement. This mass movement, except at times of defecation, terminates at the junction of the ileac colon and rectum.

In constipation, the fecal mass may become dryer and dryer, due to the thriftiness of the colon in absorbing food residue and water. Fluid secretion is added to the food by the glands of the mouth, stomach, small intestine and mucus, perhaps from the proximal colon; also fluid is secreted from the liver and pancreas in quantity. This is added to the water consumed, and a large part of this fluid is reabsorbed in the large bowel and returned to the general circulation.

In herbivorous animals the colon is large and long and serves as a reservoir for further fermentation and digestion of cellulose, while in meat eaters the colon is short and only serves to extract water. Dr. Mayo and many others call attention to this variation in the length of the colon. Man, by this rule, is definitely an omnivorous animal and is provided with a capacious cecum and a fairly long colon.

The purpose of the design of the saculations or haustrations of the colon is not clearly understood except that they are known to select small masses of contents, squeeze out the fluid, and return the residue to the lumen of the bowel.

The rectum is usually empty except at the time of defecation, and it is said that unevacuated material is frequently returned to the sigmoid by reverse peristalsis.

Lewis Gregory Cole holds that in the stomach the gross movements and tonus are due to the thick muscular coats, but that peristalsis is performed by the muscularis mucosa. Fluids pass through the tube without peristalsis, according to Alvarez, but solids hang up some distance above any lesion that interrupts or interferes with peristalsis.

Dr. Larimore feels that the added length, due to left-sided redundancy, slows down the time of evacuation and allows inspissation to continue longer, and that relaxation, and not hypertonus, is the common cause of constipation.

SYMPTOMS

The name, spastic colitis, is objected to by those who point out that it is not an inflammatory disease. It is also called chronic colospasm, spastic constipation, and Stacey Wilson calls it tonic hardening of the colon. Some writers suggest that it is an early part of a sequence: constipation, spastic colon, muco-membranous colitis, ulcerative colitis, shortening and contraction of the bowel and diverticulosis.

Patients showing mucous colitis are the neurotic, self-examining type who have had spastic constipation.

The outstanding symptoms are pain and failure of regular bowel movement. The pain is usually in the lower abdomen, but may be up the left side, in the splenic flexure region under the left diaphragm or may be along the transverse colon. The pain may be dull and boring and imitate pelvic disease. It may be stabbing, and suggest ureteral calculus, and it may be colicky and be confused with gall-bladder disease. A large number of these people have a complicating gall-bladder disease. Many regrets follow ill-advised operations for appendicitis, cholecystitis and ovarian cyst, when the pain was actually due to spastic colon.

The pain usually follows defecation, especially in the type associated with mucous colitis.

Where much roughage or many irritating purgatives have been used the pain is associated with fermentation and rumbling gas, especially in the upper left abdomen. The gas cannot be expelled and soda gives no relief.

Aside from the pain the patient is nervous, depressed, apprehensive and given to worry about each bowel movement. He is afraid to eat, he takes purgatives and loses weight.

Examination of the abdomen at times shows a generalized tenderness, but most often the descending colon is rolled under the fingers as a tender rope-like tube.

On the right side, the cecum can be made out as a distended (sloshy) sack. The rectal sphincter is tight, fissures and hemorrhoids are common; the proctoscope, however, gives little information save the absence of ulcers and growth and the presence of an empty rectum, contracted sigmoid, and at times streaks of mucus. The stools are hard lumps or balls, occasionally in capsules of mucus, alternating with frank diarrhea and strings of mucus. The patient can describe these accurately and minutely.

TREATMENT

A proctologist should be consulted and fissures, hemorrhoids and rectal spasm must first be corrected.

When the pain is acute hot packs on the abdomen and along the left side are helpful. Enemas usually increase the pain and the patient complains that the water is retained, but the instillation of a few ounces of warmed cotton seed oil at bedtime will sometimes give relaxation and sleep.

Purgatives should be avoided, but daily doses of emulsions of mineral oil and agar help some patients.

Though the pain is severe, morphine and other habit-forming opiates must be avoided in patients of this make-up. We do use, however, and with satisfactory results, atropin, belladonna, hyoscyamus, bromides and particularly the phenol-barbital group of antispasmodic drugs.

In the acute stage the diet should be largely liquid. Later it should include fresh milk and cream cooked cereals, cream soup and vegetable purees, cooked fruits without skins and seeds, custard, simple puddings, fresh soft cooked eggs, and toast made from stale or whole wheat bread, and germ flour bread when available. Tender, finely chopped meats (avoiding the fibrous and gristly parts) beef, white chicken and fish are given.

In the diet of certain allergic patients milk should be omitted. McCarrison, and later Larimore, have shown the influence of certain vitamins on the tonus of the bowel and we have added brewers' yeast, cod liver oil and a malt syrup to our daily diet. Eggleston calls attention to the unstable nervous system. In fact, a majority exhibit a definite neurosis and some few have a fear that they have cancer. If the relief is to be lasting this must be taken into consideration and an effort must be made to reassure them and remove the strain and stress under which they labor. However, if the pain is relieved and the constipation is corrected the patients in time forget their fears.

Some patients demand a purgative medicine and for these the mild so-called bile salt tablets will act best. They have the advantage of not increasing the spasm, and they probably help to cause a disappearance of the mucus.

Operative treatment, by resection of the sympathetic ganglion or fibers, has been tried, but after a few months the tonic hardening has recurred in the bowel.

No treatment will cure every case, but there are many cases that will be favorably influenced by hopefulness, antispasmodic drugs, smooth, bulky, high vitamin diet, plenty of water, elimination of rectal irritation and the avoidance of meddlesome abdominal surgery.

DISCUSSION (*Abstract*)

Papers of Drs. Silverman and Feemster, Dr. Rouse, and Dr. Witherspoon.

Dr. F. M. Johns, New Orleans, La.—It is indeed good to hear that some definite work is being done on ulcerative colitis. After we have found out that the patient does not have hyperthyroidism, pernicious anemia or hemorrhoids, we can still realize that there are a few cases of specific ulcerative colitis. Those cases are perhaps quite different from the ordinary mucous colitis. I happen to be a laboratory man, and I realize the cause of the lack of progress in the differentiation of these diseases, because it is quite a complex problem.

It is not sufficient to send a stool to the laboratory and have it analyzed. We have to have a culture from the mucosa. We can culture anything from mushrooms to pinworms in the stools.

Dr. Walter C. Alvarez, Rochester, Minn.—I agree with Dr. Johns. It is often hopeless to try to isolate a pathogenic organism from a stool. One must pass a proctoscope, clean off one of the smallest ulcers in the rectum, and take material from the floor of this ulcer. Bargen is at present getting the best results in acute cases of colitis with the use of a specific serum. I hope that before long it will be available commercially.

I do not like the word "colitis" as applied to patients who complain of constipation, mucus in the stools, and an irritable colon. I doubt that they have a true colitis, and the term often worries them and makes them worse hypochondriacs than they otherwise would be. Until we know more about the condition, I like to use the term "sensitive colon."

For the relief of constipation in these persons with a sensitive colon, always use non-irritating enemas of physiologic saline solution. Many patients can be entirely relieved of their symptoms if they can be taught to remove the dry plug of feces which forms in the rectum, without at the same time upsetting the rest of the bowel. A laxative will often upset digestion and will produce flatulence; a rough diet will also produce flatulence and soreness; and an enema of plain or soapy water will cause distress and will for two or three hours keep the patient running back at intervals to the toilet. An enema of physiologic saline solution taken and voided quickly, with the patient seated on the toilet bowl, will generally clean the lower bowel without causing distress. Many patients, when told to take an enema, say they know from experience that it is the best thing to do, but that many physicians have warned them against the practice. I have been searching for years and as yet I have not found any one who has been injured by the taking of enemas. Furthermore, recent studies on animals by Friedenwald and Feldman have shown that there is little to fear.

Dr. Seale Harris, Birmingham, Ala.—Dr. Silverman mentioned the *Bacillus enteritidis* as one of the causes of dysentery. The *Bacillus enteritidis* is the particular bacillus found in so-called food poisoning. Of course, we should not use the term food poisoning because it is really a food infection and it is usually due to the Gartner bacillus. It is very closely allied to the typhoid group and in some cases diarrhea is a result of infection by that organism. Usually the disease is self-limited. When the physician sees a patient with dysentery, he should try not only to cure the patient, if possible, but should do something in the way of preventive medicine. Cases of dysentery of all kinds should be reported to the health authorities, so that they may attempt to discover the source of the infection. The *Bacillus enteritidis* is most frequently found in meats, but not infrequently in milk from cows. Milk from a cow with diarrhea should never be used.

Dr. Rouse mentioned arsenical preparations in the treatment of chronic ulcerative colitis. Dr. Johns and I were in the International Conference on Health Problems in Tropical America when an article, by a Frenchman, was read on stovarsol in amebic dysentery. Dr. Johns ordered some stovarsol and reported very good results. I obtained some and in two cases we had very good results. At the same time I had the fear that any arsenical preparation strong enough to affect the organisms or cure the dysentery would also be likely to be very harmful to the human being. The third patient to whom I gave stovarsol had colitis, or dysentery, in which we could never find amebae. She had taken stovarsol without my knowing it, and during my absence from the city my associates were called to see her and thought she had a nephritis. Later she took some stovarsol under my direction and this dose almost killed her. I shall never use it again. I think Dr. Johns and some others have had some bad results from the use of stovarsol.

We have overdone the roughage diet, as Dr. Alvarez said. I used bran some years ago and believe I injured a number of patients. I have abandoned bran altogether. The proctologists tell us that in a great many cases of cryptitis they find bran in the crypts. A smooth diet should not be used too long. We can give these patients a general diet without too much roughage, but with a very high vitamin content, which is very important. Orange juice, tomato juice and other fruit juices are good. I think, as McCollum points out, that yeast is expensive and unnecessary. We can get all the needed vitamin B from vegetables and fruits. Sometimes one gets a diarrhea from yeast. The organisms pass through the stomach into the intestine and through proliferation act as irritants of the intestine.

The technic of giving an enema, as Dr. Alvarez said, is quite important. We had two postoperative cases in the hospital, both of which developed anal fissure following the use of the small hard rubber tubes in giving enemata. Following the suggestion of Dr. Gaston, of Birmingham, which I think is an excellent one, we use a large size soft rubber catheter in giving enemata. The nurses in the Gorgas Hospital are given

careful instruction in the technic of giving enemata without producing trauma of the ano-rectal tissues.

McCollum uses a quart of isotonic salt solution by mouth about one-half hour before breakfast. It gives one or two large bowel movements. He says all the salt can be recovered from the stools. In certain cases that is helpful.

Dr. Ernest H. Gaither, Baltimore, Md.—I would like to discuss very briefly Dr. Rouse's illuminating paper on ulcerative colitis. At the moment, our group at Johns Hopkins Hospital is not at all convinced that Bargen has a proven case regarding the specificity of the streptococcus which he presents as the specific organism in the classification of mucous colitis. Although we have used this method of therapy in our work with some excellent results, and expect to continue it, our percentage of success has been extremely disappointing. Non-specific therapy with antimeningococcic serum and aolan has given some good results. Of course, Dr. Bargen does not claim to make 100 per cent cures, but he does claim, as does Dr. Rouse, that the organism is the etiologic factor in ulcerative colitis. Paulson, in our Clinic, has done some splendid work, supervised by Dr. Thomas R. Brown and Dr. J. Howard Brown.

The discouraging feature about ulcerative colitis is that it is likely to recur, and it is questionable when we can consider a case cured. We believe the statistics that are published are based in a large percentage of cases on answers to questionnaires, and hence their validity is not assured. I say this because we have under our care quite a large number of ulcerative colitis patients who, if sent a questionnaire, would unhesitatingly declare themselves cured. They have no symptoms and the pain has disappeared. Yet under sigmoidoscopic examination the bowel membrane proves to be glistening and friable, and there is fluid blood, evidence that the underlying pathological condition is held in abeyance, but not cured.

At the present moment, therefore, while we of the Johns Hopkins Clinic consider Dr. Bargen's work splendid, we do not feel certain that he has found the etiologic factor, and cannot put ourselves in full agreement with his views.

Dr. F. M. Durham, Columbia, S. C.—An emulsion of agar agar and mineral oil is good, if the mixture can be obtained free from phenolphthalein. Many of the commercial emulsions contain phenolphthalein. In prescribing them, the purgative action of phenolphthalein is obtained, instead of the lubricating and mechanical action of the oil and agar agar, thus defeating the purpose for which they are prescribed.

Bran and phenolphthalein are responsible for many cases of proctitis. These are entirely too irritating to the rectal mucosa to be prescribed over a long period of time.

I have seen patients in our best hospitals positively injured by improper and careless methods of giving enemas. The anorectal mucosa is frequently lacerated by the cannula or catheter. Nurses should be made to use a finger cot and to insert the finger into the anus before giving an enema until they become thoroughly familiar with the procedure.

In my country, every case of chronic loose bowels and some cases of constipation are due to amebic infection. Camp Jackson was situated in my home town. Perhaps this has had something to do with this infection.

Dr. Alvarez.—I should like to put in a good word for stovarsol. There are some persons who are so highly sensitive to arsenic that they will get into trouble after small doses of any form of the drug, but the average man will have no difficulty. I know a physician with colitis who for years now has taken enormous doses of stovarsol apparently without any harm. At the Mayo Clinic we usually give three tablets a day for four days. Dr. Philip Brown tells me that in Dr. Logan's section they now use more treparsol than stovarsol. I think the fact that a very occasional patient may have a troublesome or dangerous idiosyncrasy should not deter us from using helpful drugs.

Dr. Rouse (closing).—We make our vaccines only from cultures obtained directly from the bowel mucosa.

Dr. Alvarez aptly uses the term "sensitive colon" instead of "colitis" to describe these bowel disturbances. Similarly, I spoke of an "irritable colon."

Dr. Harris stresses the danger of stovarsol. Treparsol, with the same dosage, is much more quickly eliminated, and is therefore much safer. The patient should be warned never to use stovarsol or treparsol over a long period of time.

I have a wholesome respect for Dr. Paulson's work in Baltimore. A difference of opinion will stimulate further study and discussion.

This paper should reach the general practitioners rather than the gastroenterologists assembled here, because the former more frequently fail to diagnose chronic ulcerative colitis. We should all readily recognize the typical clinical picture herein described. If facilities for culturing the mucosa and preparing a satisfactory vaccine are not available, the patient should be referred to some one with such facilities.

COMPRESSION FRACTURES OF THE VERTEBRAL BODIES*

By GEORGE A. TRAYLOR, M.D., F.A.C.S.,
Augusta, Ga.

It is not my purpose in presenting the subject of compression fractures of the vertebral bodies to attempt to consider fractures of the spinal column as a whole, but to draw attention to a type of injury which is said frequently to go unrecognized. Broadly speaking, spinal fractrues may be divided into those in which there is demonstrable injury to the spinal cord, and those in which signs of cord lesions cannot be elicited. Fractures of the vertebral bodies without cord symptoms are the subject of this discussion. At the outset novelty is disclaimed, for this injury has been known for many years, but it is only within the last twenty-five years, and with the perfection of roentgen ray technic, that its frequency has been demonstrated. In

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certain industries, for example, coal mining, it is said to be rather common, but it is believed that it is of less frequent occurrence in the practice of those who do general surgery, and especially those of us who see ordinary industrial accidents. It is likely that with the modern means of transport afforded by the ever-increasing use of the motor car and aeroplane, an increase of its incidence will be observed.

It has been stated that 50 per cent of these fractures have passed undiagnosed, but it is doubtful that this statement would be correct at this time. It is the paucity of symptoms, particularly those referable to cord injury, that is so misleading. Another probable reason is what appears to be the slight traumatizing force. May we not ask ourselves the question: Have we not often attributed the after-effects of some injury to the back, which at the time was considered trivial, to muscle strains, arthritis, contusions or neuroses, when an injury of the severity of the one under consideration may have been the reason for the delayed and pain-producing convalescence?

If pressure of sufficient moment is brought to bear upon the spinal column from one end to the other it will give way at its weakest point. This force may be from above downwards or from below upwards, as from a heavy weight falling on the head or shoulders, or a sudden fall upon the buttocks. In either case there is hyperflexion of the spine; and the point where the greatest pressure is brought to bear is the one that suffers the injury, usually where the two normal curves of the spine meet, "at a point where the supporting cage of the thorax is absent and where the vertebral bodies are less broad and heavy, namely, from the tenth dorsal to the second lumbar" (Frederic J. Cotton). Usually only one body is crushed, but it is not unusual for more than one to be involved. The intervertebral discs and the surrounding and supporting structures, likewise share to some extent in the injury.

The symptoms as summarized by Dr. Frederic J. Cotton are:

> A lame back after a fall, or crush; localization of symptoms in the middle line; localization in the suspected segment; kyphosis, not conspicuous but nearly always visible or palpable; possibly a hematoma or local swelling; nerve root pains, girdle pains; rarely disturbances of sensation about the waist; usually a good deal of rigidity, or muscle spasm; no sign of cord lesion.

If a roentgenogram is made, and one should always be made if there is room for doubt, it should be interpreted by an expert radiologist. When the plate is viewed ventro-dorsally or vice versa, not much can be determined. In all cases a lateral exposure should be made, and from this it is not difficult to interpret the findings. Dr. Cotton states that the only condition with which it may be confused is the "occupational" wedge-shaped vertebra of A. Lane; and that if the clinical and roentgen ray examinations are made very soon after the receipt of the injury there is very little likelihood of confusing the two.

Knowing the nature of the injury, the indications for treatment are clear: hyperextension of the spine for at least six to eight weeks. In three of the cases herewith reported Whitman's modification of Bradford's frame was used, making the angulation in the frame correspond as nearly as possible to the site of the crushed vertebral body. This latter is not difficult if measurements of the patient and frame are made prior to placing the patient thereon. For some days, pain-relieving drugs may be necessary, but almost simultaneously with adjusting the patient to some form of hyperextension mechanism the discomfort ceases. After the period mentioned the patient may be allowed up, and as soon as possible a properly fitted brace may be applied. This should be worn while up for a minimum of twelve months. Light work may be allowed within three months from the date of injury, but heavy work should be advised against for at least one year. Exceptional cases may not respond to such simple measures and may require some form of spinal fixation, as the Hibbs or Albee operation. However, it is believed that they are rare and not the rule.

It is believed by some that crushing fractures of the vertebral bodies are responsible for a percentage of cases of rarefying osteitis or Kummel's disease. If this be so it is probable that a prompt recognition of the injury and its proper treatment will result in almost entirely eliminating this sequel.

CASE REPORTS

Case 1.—In Miss A. W., age 55, the past history and physical examination both were essentially negative, except for moderate arteriosclerosis, accompanied by a blood pressure of 175/100. She was rather above the average in flesh for her height. In March, 1925, she was motoring to Savannah, Georgia, and when she was within a few miles of her destination the rear wheels of the car ran into what appeared to be an insignificant depression in the road. At the time they were traveling about 25 miles per hour. Miss W. was thrown upwards, her head striking the top of the car, and falling back she struck the seat with her buttocks.

She told her companion, who was sitting beside her, and who did not have the same experience, that she was hurt. Upon reaching her destination she received medical aid, and after remaining there for a few days came to Augusta by train, accompanied by a nurse. When first seen she complained of severe pain in the right side extending around to the mid-line anteriorly, a semi-girdle pain. Opiates were necessary for relief. As soon as possible a skiagram of the spine was made, and you can see that it would have been almost impossible to diagnose the injured vertebral body had not a lateral view been made.

She was placed on Whitman's modification of Bradford's frame and an angle was made to correspond to the crushed vertebra. After one week of hyperextension, no further pain-relieving drugs were required. She remained on the frame for six weeks. When last heard from, a few months ago, she was enjoying the best of health and had no discomfort referable to the accident.

Case 2.—Mrs. T. J., age 25, a hairdresser, on the evening of April 3, 1926, was descending some cement steps when suddenly her feet slipped and she fell, striking her buttocks upon the unyielding surface. She was placed upon a couch and was examined shortly after the accident. Her chief complaint was a girdle pain. She was sent to the University Hospital, where a more thorough examination was made. There was a slight kyphos over the ninth dorsal vertebra, the only neurological finding being the girdle pain above mentioned. General physical examination was essentially negative. The next morning the radiologist reported: "A crushing fracture of the ninth thoracic body, the vertical diameter of which is slightly less than 2 cm. Very little kyphosis."

She was treated like the preceding case for six weeks. On May 5, 1926, the report from the radiologist was: "There is considerable callus formation at the site of fracture with sufficient cartilage formation between the articulating bodies."

This patient had a plaster cast molded to her torso, from which a brace was made. Since leaving the hospital she has been heard from frequently and is enjoying excellent health.

Case 3.—Mrs. L. R., age 77, the widow of a physician, came to Augusta to spend the winter. She consulted me early in December, 1926, for backache. She gave the following history: fifty years previously she was on a Hudson River boat on her way from New York City to her home. The boat was behind schedule and when her landing was reached instead of "tying up" a broad plank was thrown to the landing, and she started across. When about half way she noticed the plank pulling off the landing, and some one on the landing called to her to jump, which she did. The person advising her to jump caught her hands, but she struck her abdomen against the sharp edge of the landing, "doubling" her up. She suffered considerable pain and remained in bed on her back for about ten weeks. Since then she has always had backache. She attributes her recent exacerbation to having caught her foot in a rug and fallen.

General physical examination was negative. Blood pressure was 146/80. The pains were generalized over the dorsal and lumbar regions. There were no particularly painful areas. There was kyphosis over the lower dorsal spines. She was sent to the University Hospital on December 13, 1926, and the next day x-ray of the spine was made. The report was: "Lateral view of the lower thoracic spine shows considerable narrowing or thinning of the eleventh thoracic body and slight thinning of the twelfth thoracic body, with some proliferation of bone about both. Both twelfth ribs show what appear to be old fractures about one inch from the spinal column, with some agglutination in both. There is a productive arthritis in the lumbar spine."

She decided to consult a specialist and left the hospital January 31, 1926. While in the hospital she was given diathermy; and, at her request, 25 micrograms of radium emanation intravenously on December 30, 1925; January 11, 1926; and January 25, 1926.

Before leaving the hospital she asked that she be allowed to take her x-ray plates with her. Recently a communication addressed to her requesting the loan of the skiagram was answered by her executor, saying that she died in California in 1928. I regret that we have no duplicate. Her back injury of a half century ago was most probably the cause of her chronic invalidism.

Case 4.—Wm. T., age 17, April 26, 1930, was riding a motorcycle and collided with an automobile. Soon after the accident he was seen in the emergency room of the University Hospital. He had pain in the back and a semi-girdle pain on the right side. This young man has an old chronic endocarditis, which gives him only slight trouble. As soon as practicable he was sent to the radiologist for an x-ray study of the spine. The report was: "Lateral view of the thoracic and lumbar spines shows compression fractures of the bodies of the twelfth thoracic and first lumbar, causing a lessening of the diameters of their anterior portions."

He was treated like the first two patients and afterwards a brace was applied, which he is still wearing. It is too soon to predict the ultimate outcome.

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DISCUSSION (*Abstract*)

Dr. A. R. Rozar, Macon, Ga.—Sometimes I think that there is no x-ray picture that misleads us so much as that of compressed fracture of the vertebra.

I recall a case in which x-rays were supposed to show a compressed fracture of the fourth lumbar vertebra. Two subsequent x-ray examinations showed no fracture. No lateral views were taken and evidently the mistake in the first examination was due to this fact.

I noticed that Dr. Traylor had all of his cases x-rayed laterally. Unless x-ray work in compressed fractures of the vertebra is done very carefully by competent men, we shall often make mistakes.

Dr. Charles C. Garr, Lexington, Ky.—My opinion is that the reason in years gone by that many people had nervous backs, or "railroad spines," was that they had compressed fractures.

I wish to mention a case which, perhaps, will save you embarrassment that I recently had. A man was brought into my office having fallen from a ladder on concrete steps, striking on his back. He could not walk, he was in great pain, any motion of the spine caused him to utter a loud cry. He was carried into the x-ray room by four men.

He showed very definite compression fractures of the first and second lumbar vertebrae. In a hasty opinion, I told him that he must go to the hospital; that he must be put in fixation; that he probably could not return to work for three or four months.

The following day he was very much improved, and the third day he dismissed me from the case. He had another physician who did not x-ray his spine. I could not account for his getting well.

Upon later investigation it was learned that this man had lost eight months from work ten years before, when he had a back injury.

What he had, in my opinion, was a compression fracture. These old cases on x-ray do not show a callus formation as we see it in a femur. I have had two patients with healed compression fracture who intentionally injured their backs and asked for x-ray examination.

We should find out about previous injuries in reported cases of compression fractures.

Dr. E. T. Newell, Chattanooga, Tenn.—This subject is considered so important by two of the railroads which I represent that they have given me instructions that every man who has an injury to his spine must be x-rayed.

Now, it is not in the cases where a man has a dislocation of his vertebrae or compression fracture that injure the cord that railroad surgeons are liable to get into trouble. It is, in such cases as the essayist has brought before you today. It is very important, as one of the speakers who preceded me has said, to have the films interpreted by a competent roentgenologist.

It is also important to have views in all of the classical positions, especially the lateral view. You are liable to miss a small fracture if you take only stereoscopic anterior-posterior views.

I saw a case recently of fractured spine, four months after injury, that had not previously been x-rayed. The mere fact that this case was not x-rayed early, when proper treatment would have benefited him, caused the insurance company to have to pay this man fifty-five hundred dollars unnecessarily, the man being permanently disabled.

All spinal fracture cases do not show symptoms at first. The physician often misses them. When the patients get up on their feet and put their weight on the spine, their condition is aggravated and it does not take a physician very long to tell that the man then has had a fracture.

I find that we get into trouble most frequently where we have multiple fractures. If a man comes in with a fractured leg, complaining of pain in other regions, with cuts and abrasions, you put his leg up in a Thomas splint, sew up his wound, dress it, keep him in bed for four or five days or a week and pay little attention to his complaint of pain in his back. These cases are the ones that often get you in trouble.

When a man has a slight back injury and multiple injuries elsewhere in his body, it is very important to x-ray his back. Otherwise you will overlook in many instances his most serious injury until he tells you some days later that he has an injury to his spine.

I would suggest that Dr. Traylor keep his patients in bed another month. He says he keeps them in bed two months. Then, of course, they should wear a brace and they should be careful not to put much weight on the fracture for at least a year.

Dr. J. T. McKinney, Roanoke, Va.—I should like to call attention to six proven cases of compression fracture of the bodies of the vertebrae which were produced by muscular lifting. These patients were not struck by any object and no direct force was applied to the back. The fractures were produced in the act of lifting heavy objects, thereby causing an acute hyperflexion of the spine.

Within the last month or so we had a case of compression fracture of the twelfth dorsal vertebra due to lifting, which was reviewed by a very distinguished orthopedic surgeon in Boston, who said he had never heard of a compression fracture of the body of the vertebra due to lifting or muscular strain.

In another case, in which one of the railroads was being sued in Cincinnati, there was a compression fracture of the first lumbar vertebra, sustained when the employe attempted to raise a rerailer which weighed something like 150 pounds. The court held that the railroad company was not liable, as there had been no negligence on its part.

It is important to realize that you can sustain a compression fracture of the body of a dorsal or lumbar vertebra by muscular action alone.

A semi-oblique view of the spine is a distinct help in visualizing the lamina and articular facets, and in doubtful cases it should be used in addition to the straight lateral view of the spine and the antero-posterior stereoscopic films.

Dr. L. P. Holmes, Augusta, Ga.—I should like to stress one spinal lesion, so-called Kummell's disease.

Occasionally following a more or less trivial injury to the spine, a negative roentgenogram may be obtained, followed by pain which may subside, later to recur. A film made possibly two years later may show a definite decrease in the vertical diameter of the vertebral body, which was negative on the original film.

The etiology of this condition is still under discussion. One of the plausible explanations is that there was a disturbance to the nutrition or blood supply in the original injury which later on caused a weakening of the supporting structures and a thinning down from weight bearing. I agree with Dr. Traylor as to the importance of the lateral film. It is entirely possible

to miss a compression fracture of the spine, sometimes, if it is viewed only in one antero-posterior view. The films should all be made on the Potter-Bucky diaphragm, not by a flat film in bed as the surgeon often advises.

Often injuries thought to be trivial may cause slight compression fractures which can easily be demonstrated by lateral films.

Dr. E. Bennette Henson, Charleston, W. Va.—I believe a detailed study of the history of the force producing the trauma, together with a careful examination of the spine, will disclose sufficient evidence to warrant a diagnosis of compression fracture before an x-ray is ordered. If the patient is placed in the "jack knife" position as far as can be tolerated, by deep pressure over each vertebral segment separately the fractured vertebra can be isolated. The well known local sign of fracture of a long bone applies to fracture of the spine, because even though the chief damage is in the anterior body of the vertebra the posterior part has, by the very nature of the trauma, been damaged.

These patients should not be without a spinal brace for many months. My experience has convinced me that six months is the minimum. Too many of these patients for economic reasons will discard their braces in two or three months and return within a year or two with a diagnosis of tuberculosis of the spine. They do not have tuberculosis, but what they do have is a deformity due to too early weight bearing.

Dr. James R. Garner, Atlanta, Ga.—Where there have been multiple injuries fractures of the spine will sometimes be overlooked and even the x-ray will deceive us, particularly if the fracture is of the last lumbar vertebra.

Often fractures in the lower part of the spine are very difficult to demonstrate by the x-ray, but the possibility of their presence must not be overlooked.

Dr. J. L. Netto, West Palm Beach, Fla.—I should like to ask Dr. Traylor what effect the age might have in the length of time these patients, without cord symptoms, should be kept in the Bradford frame or in the plaster jacket before they are allowed up.

Dr. Traylor (closing).—I have kept the patients that I have treated in bed for from six to eight weeks.

The woman, who was about fifty-five years of age, stayed in bed for about eight weeks. After these patients get up and wear a brace, they practice automassage, which is very useful to them.

However skilled one may be in diagnosis, it is my belief that the clinical diagnosis should be confirmed with the x-ray. Quite a few of these patients are going to have pain for a long time following the injury, but if they know the exact nature of the injury to the back they will take better care of themselves and adjust themselves to a form of living which will put as little extra work on the back as possible.

RUPTURED GASTRIC AND DUODENAL ULCERS*

By J. Morehead Emmett, M.D.,
Clifton Forge, Va.

It is difficult to discuss acute perforated gastric and duodenal ulcers without describing in a general manner one's views regarding the surgical treatment of peptic ulcers generally. Recognized statistics show that about 90 per cent of the patients who have acute perforations have a background of chronic gastric distress. Frequently this fact cannot be determined until convalescence is well established, because the acuteness of the symptoms and the profound agony erases from the patients' minds all memory of previous discomfort.

We feel that the discussion of peptic ulcer must necessarily be divided into the actual regional differences of location of the ulcer, gastric or duodenal. The physiological function and the possible pathological changes to be anticipated differ very materially in the stomach and duodenum. Consequently the indication for treatment must be individualized.

It is sometimes very difficult to determine which ulcer should be handled medically and which one should have surgical treatment. We have taken the general position that gastric ulcers should first be handled under strict medical management. Although we are not sure that an appreciable number of gastric ulcer patients are cured by medical treatment, we do know that many of them are rendered symptom free. It is usually necessary to keep such patients under observation for a long period of time, probably years. When there are repeated recurrences following medical treatment, then we feel that such patients should have surgery instituted. Our other indications for instituting surgical treatment in gastric ulcers have been, first, large callous ulcers, their very size making a differentiation from carcinoma impossible. We have never seen any of this particular group of ulcers materially improved by medical treatment, and frequently when the stomach is exposed at operation we have had difficulty in determining whether we were dealing with a simple ulcer or with one associated with early malignancy. Second, we feel that all bleeding gastric ulcer pa-

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tients should be operated upon. Third, ulcers which are so situated as to block the pylorus are also handled surgically.

Surgical treatment, to be effective, must change materially the gastric physiology. Gastric surgery constitutes a true epic in a patient's life and we must be sure that we are not going to do some operation which will result in our patient's having continued gastric distress. A study of the results in our own patients, and the general impression gathered from other clinics, convinces us that the operation of partial gastrectomy more completely meets this requirement. Whenever possible we have done the partial gastrectomy after the method of the Billroth I. When mobilization of the duodenum has made it impossible to do a direct anastomosis between the duodenum and stomach, then we have done a modified Billroth II operation.

Ulcers of the duodenum present a different problem. Ordinarily these patients can be kept symptom free and frequently cured by systematic medical treatment. Even the acute ulcers of the duodenum, interfering with the normal emptying cycle of the stomach, frequently respond beautifully to medical management. We have resorted to surgery in our duodenal ulcer patients only when there has been a persistent or voluminous hemorrhage, or when there has been a very marked gastric retention. We feel that posterior gastro-enterostomy or some form of pyloroplasty results in a sufficient number of cures in duodenal ulcers to justify their practice.

Increased knowledge of various pathological processes and the improvement in surgical judgment have robbed surgery of much of its drama. Many operations which were once done as emergencies are practised today electively. However, the mortality in perforated gastric and duodenal ulcers still goes hand in hand with the time element of operation. It is impressive to remember that the mortality in perforated ulcers operated upon between two and three hours after the onset of symptoms is little higher than operations for acute appendicitis. The mortality increases with the hours of delay and those operations which are delayed for twelve hours or longer show a mortality rate of 40 per cent or higher. With the above fact in mind, one may be pardoned for burdening the profession with listening further to a subject so common to us all.

The clinical picture produced by a perforated gastric ulcer is ordinarily clear cut and obvious. However, it may be of interest to know that one of the large European clinics reports that 35 per cent of its perforated ulcer patients were explored first through an incision in the right iliac region, meaning that the operative diagnosis was acute appendicitis; and unfortunately acute appendicitis is not always considered a disease requiring emergency treatment.

Perforations are much more common in men than in women. From our own series of 32 cases there were 31 men and one woman. We know very little about what causes an ulcer to perforate. The majority of perforations occur while the stomach is full, frequently just after eating. However, one of our own cases perforated in the middle of the night, while the patient was asleep. The symptoms which are most constant are, first, severe and sudden agonizing pain, usually in the epigastrium. This pain is frequently so overwhelming as to cause the patient to fall to the floor. It is observed that large doses of opium do not always give relief. These patients have a subnormal temperature for the first few hours. The skin is ordinarily cold and clammy. An observation of great diagnostic value is a persistently slow pulse. The increased pulse rate which is constantly observed from perforations of other abdominal viscera is strikingly absent in perforated ulcer of the stomach or duodenum. We feel that this peculiar phenomenon is often misleading to the practitioner who sees only an occasional case of ulcer perforation. We have found various degrees of nausea in these patients. A considerable number of them have not vomited when we have first seen them. The generalized abdominal rigidity, which is ordinarily board-like in character, is more pronounced in the upper abdomen, although the entire abdomen is usually intensely rigid. The absence of liver dullness is relatively constant a few hours after perforation. The occurrence of an immediate leucocytosis is of interest. In doubtful cases the readily available radiographic study may be helpful in establishing the diagnosis by finding the pneumoperitoneum, which is observed in the form of a freely movable gas bubble in the abdominal cavity.

The clinical picture induced by perforated ulcer should be relatively clear and unmistakable, but there are other abdominal crises which prove difficult to differentiate, even in the hands of the most skillful observers: acute appendicitis, acute gall-bladder infection or perforation, or pancreatitis or hemorrhage. Of this group, acute pancreatitis is the disease most constantly

confused with perforated peptic ulcer. Ordinarily, however, the pain is about equal in the two diseases. The prostration is greater in acute pancreatitis and the vomiting is likewise more pronounced and uncontrollable in pancreatitis, causing one to think often of intestinal obstruction. Dr. Halstead called attention to the livid face and the bluish patches over the abdomen and limbs observed in patients suffering with acute pancreatitis. The abdominal rigidity in pancreatitis is more generally limited to the upper abdomen. All these confusing abdominal conditions, however, are surgical problems and much may be gained by having surgical consultation. Occasionally the diagnosis can only be cleared up by having an exploratory incision.

We are not yet agreed on what particular surgical procedure should be practised when the abdomen is opened for gastric and duodenal perforations. There is still a very great variation of opinion as to the choice of operation. Until a few years ago we felt that the duodenal and gastric ulcer patients who were operated upon early should routinely have, in addition to their ulcer closure, a posterior gastroenterostomy. In our late cases with definite peritonitis we only close the ulcer. A few of these late cases made recoveries and we soon became impressed with the apparent permanent relief of symptoms which was manifested in this group of patients who did not have gastroenterostomies. At about this time two of our own patients, upon whom we had done gastroenterostomies for perforated ulcers, and two patients from other clinics, came to us with marginal ulcers. A review of the literature at that time convinced us that other surgeons were beginning to feel as we did about this matter: that possibly all perforated cases had best be handled by a simple closure, inasmuch as we were dealing at the time with the problem of saving our patients' lives. If there was a persistency of ulcer symptoms after these patients had recovered from their immediate crises, then we felt that the problem could best be dealt with with an idea of giving them permanent relief by surgery.

With this thought in mind, we have discontinued completely the practice of doing gastroenterostomies upon our perforated ulcers and I am sure that our operative mortality has been no greater and the relative relief of symptoms permanently has been just as satisfactory as was experienced when we did the combined operation.

To emphasize the difficulty in diagnosing gastric and duodenal perforations, I wish to report briefly three cases, one clear cut and obvious case and two cases that were confusing to us:

M. M., a man, age 62, was seen in consultation with Dr. M. B. Jarman, Homestead Hotel, Hot Springs, Virginia.

His chief complaint was of severe acute pain in the upper abdomen.

The patient had been a semi-invalid for the preceding ten years, seeking health at the various resorts. He had been studied at some of the large Eastern clinics, where a diagnosis of moderate proliferating arthritis involving his lower dorsal vertebrae was made. His incapacity had been caused by constant pain in his back, just below his right scapula.

On March 9, at 3:00 p. m., he was seized with an acute severe pain in his epigastrium. This pain radiated to his back, near the source of his old discomfort. He was not nauseated. He was seen by Dr. Jarman at 3:30 p. m., at which time he was very tender in the epigastrium, was not nauseated, and complained of great pain in this region. His pulse was 72, blood pressure 120. He was given satisfactory relief following ¼ grain morphine hypodermically. At 6:30 p. m. on the same day the pain in his epigastrium recurred very violently and soon became agonizing in character. At this time examination showed that his upper abdomen was very rigid and board-like, his lower abdomen was tender and slightly rigid, and liver dullness was absent. His pulse was 70, temperature was 97.6°, and blood pressure was 120/76. Following ½ grain morphine, which did not give him relief, he became nauseated and vomited some clear gastric contents. He was given ¾ grain morphine between 7:00 and 11:00 p. m. His white blood count showed that he had 19,000 white cells, 91 per cent polymorphonuclear neutrophils, 7 per cent small lymphocytes, and 2 per cent large lymphocytes. Urine analysis showed a faint trace of albumin and negative microscopic findings.

I saw him at 11:15 in consultation with Dr. Jarman. The above findings were still present and probably increased. A tentative diagnosis of acute perforated peptic ulcer was made and operation advised and accepted. At 12:30 his abdomen was opened under a light ethylene anesthesia. His peritoneal cavity was found filled with free bile and further intra-abdominal inspection showed that the bile was escaping from a ruptured ulcer in the fundus of the gall-bladder. Gallstones were free in his upper abdomen and the gall-bladder contained a large number of gallstones.

C. M., a man, age 56, was seen in consultation with Dr. G. A. Torrence, of Hot Springs, Virginia.

His chief complaint was of sudden and severe pain in the upper abdomen followed by great soreness in the epigastrium and respiratory embarrassment.

This patient stated that he had been having gastric distress, relieved by soda and eating, for the preceding six years. At 3:00 a. m. on June 15 while he was asleep, he was seized with severe pain in the epigastrium. This pain was agonizing in character for one hour, but it gradually subsided without the assistance of medicine.

Dr. Torrence was called to see him at noontime on June 18 because of the great tenderness in his epigastrium. The patient stated that he could hardly bear the excursion of respiration. He had had no nausea,

but since his primary attack on June 15 he had been kept in bed with the intense tenderness in the epigastrium. He had a little diarrhea on June 16 and 17. On the latter day one of his stools was dark and gummy. A white blood count showed that he had 20,000 white cells with 94 per cent polymorphonuclear neutrophils, 4 per cent small mononuclear lymphocytes, and 2 per cent large mononuclear lymphocytes. His red blood count was normal. Examination of his abdomen showed that he was very rigid in the entire upper abdomen with a point of extreme tenderness over the pyloric end of the stomach. Liver dullness was absent. A tentative diagnosis of perforated peptic ulcer was made, operation was advised and accepted. At 3:00 p. m. on June 18 operation revealed a perforated gastric ulcer just posterior to the lesser curvature. A considerable amount of partially digested food, blood and pus was found well walled off in the lesser peritoneal cavity.

C. A. B., a man, age 50, was seen in consultation with Dr. G. S. Hartley, Medical Department, Chesapeake & Ohio Hospital, Clifton Forge, Virginia.

His chief complaint was of pain in the stomach.

He had suffered with chronic gastric distress for the previous several years and he had taken volumes of soda, which gave him relief. It was found also that food gave him relief. At 3:50 p. m. he was seized with a sharp pain over the region of his stomach. When this pain occurred he was engaged in his employment as a machinist at the shops and because of the severity of the pain he could not continue to stand upon his feet. At 5:00 p. m. he was seen by his family physician and a dose of hyoscine and morphine was given to him. He was not relieved of his pain and at 5:30 he became nauseated and vomited some gastric contents stained with blood.

When seen at 8:00 p. m. his abdomen was intensely rigid and board-like all the way above the umbilicus. Some tenderness and rigidity below the umbilicus was present. His temperature was 98°, pulse rate was 90, and he was suffering severe and agonizing pain. His expression was drawn and apathetic. The blood pressure was 125/90. A white blood count showed that he had 16,400 white cells, 87 per cent polymorphonuclear neutrophils, 12 per cent small mononuclear lymphocytes, and 1 per cent large mononuclear lymphocytes. A diagnosis of perforated peptic ulcer was made, surgery was advised, and operation done at 9:00 p. m. There was revealed a large perforated ulcer along the lesser curvature of his stomach, near the pylorus. The gross ulcer was large and callous in character, giving evidence of a long-standing chronic ulcer.

DISCUSSION (*Abstract*)

Dr. R. J. Wilkinson, Huntington, W. Va.—Dr. Emmett asked me to open the discussion on this paper because he and I have differed materially in the method of treating ulcer. There is very little for me to take issue with him now, for he has changed some of his former views.

I am delighted that he brought out the point that perforated ulcer patients are acutely ill and that it seems logical to do the simpler thing, namely: close the ulcer. I have found the mechanical suction apparatus invaluable in removing the irritating fluids from the peritoneal cavity, and no doubt their removal shortens the period of convalescence.

The only thing on which I can take issue with him is that he advises partial gastrectomy in most ulcer cases. I believe the surgery should be fitted to the individual case. One operation does not fit the whole field of ulcer.

Dr. Seale Harris, Birmingham, Ala.—There was a time when there was a difference of opinion among surgeons and internists regarding the treatment of gastric and duodenal ulcers. Now all surgeons and internists agree that practically every case of ulcer should have the opportunity for relief by dietetic and medical treatment; but if, after thorough medical treatment, the ulcer patient does not get well and remain well he should be operated upon. A larger proportion of duodenal ulcers than of gastric ulcers will get well under medical treatment. There is practically no danger of a cancer of the duodenum, but when a patient of cancer bearing age has symptoms of ulcer of the stomach an immediate operation should be performed because of the greater probability of cancer's developing on a gastric ulcer base. Early operation and resection of a part of the stomach cure a small proportion of gastric cancers and the earlier the operation the greater the patient's chance for cure.

As to the treatment of bleeding ulcers: in the last twenty-five years I have had to treat many cases of gastric hemorrhage. I can recall only two hemorrhage patients who died and one of them was operated upon. Surgery in a patient with a bleeding ulcer is a very serious thing, and I do not think it should be resorted to except in rare cases. Hemorrhages from a gastric or duodenal ulcer usually will stop spontaneously. Usually the only thing to do is to give morphine. If it is a very large hemorrhage, a small blood transfusion (250 c. c.) will aid in stopping the bleeding and will help tide the patient over the crisis. Large blood transfusions are not indicated in bleeding ulcers because they may increase the hemorrhage.

As to the type of operation: during the last year we have had 3 cases of ulcer that recurred following pyloroplasty. Two of these pyloroplasties were done by eminent surgeons whose technic was above reproach and the third by a man whom I believe to be a good surgeon. These three recurrences of ulcer after pyloroplasty make me believe that gastroenterostomy is the better operation.

As to the diagnosis of perforated ulcers: in some cases it is easy; in others it is a very difficult diagnosis to make. I had the interesting experience some years ago of a patient's having a perforation of his duodenal ulcer while he was lying down in an examining room waiting for me to see him. I believe that in perforating ulcer, as in appendicitis, it is a mistake to give the patient a narcotic until he has consented to the operation.

The preoperative and postoperative dietary management of the ulcer patient will prevent acidosis. The dietary treatment before and after gastric operations for ulcer is entirely different from that employed in the medical treatment. I know of no better way to bring on acidosis than by giving the Sippy high fat ulcer diet for a few days before a gastric operation. The well nourished ulcer patient in whom there is no retention needs very little preparation for an operation, but where there is gastric retention and when the ulcer patient is undernourished several days should be taken in preparation of the patient for operation. He should

be given large quantities of fluid and carbohydrates, but no fats. The same is true after operation. The patient should be given at least four quarts of liquid a day for one or two days before and three or four days after operation. Dextrose (corn sugar) or glucose (corn syrup) in 5 per cent solution may be given by mouth or by hypodermoclysis, or in 10 per cent solution very slowly intravenously. We are in the habit of giving our patients only water per rectum. Even the 5 per cent glucose solution per rectum frequently causes abdominal distension, and it is questionable how much of the glucose is absorbed when given per rectum. None but the very large hospitals that can afford expensive equipment and well trained chemists should prepare glucose to be given intravenously and subcutaneously. The pharmaceutical houses get out ampoules to which distilled water may be added for subcutaneous and intravenous use. Nurses should not be trusted to give glucose or fluids subcutaneously. In one of our cases in which the nurse was trusted to give 5 per cent glucose solution under the breast, the needle was introduced into the lung. The same accident occurred to an interne in a large teaching hospital.

The surgeon can prevent many recurrences after operations for gastric and duodenal ulcer by careful dietary management for some time after the operation. The idea that the ulcer patient can have what he wants to eat two weeks after an operation is responsible for many recurrences and marginal ulcers. The gastric or duodenal ulcer, as ordinarily seen, cannot heal in two weeks and the diet should be regulated for months. The ulcer patient cannot consider himself permanently cured for one or two years, either after medical or surgical treatment. He should be taught how to take care of himself, not only to regulate his diet, but his regimen of life.

Dr. J. L. Netto, West Palm Beach, Fla.—I wish to report two cases of perforated duodenal ulcers in men both past sixty years of age, without the admission of any previous gastric distress. They were treated conservatively and are apparently healthy now, after a period of two years.

Dr. E. B. Claybrook, Cumberland, Md.—There are two things that I have always stressed in this connection. They were two points brought out in connection with perforation and injury in the abdomen rather than perforation in disease.

In 1904, I brought out the first one which was the transmission of the heart and respiratory sounds all over the abdomen in the presence of perforation. You will find the description in Moynihan's "Abdominal Operations," first volume, new edition.

The diagnosis must be made early and early operation is necessary to save the patient. If you put your ear down on the abdomen and hear the heart and respiratory sounds as clearly as over the chest, it means trouble.

I think the profession, as a rule, loses sight of the value of auscultation in the injured and acute abdomen. This symptom is not present in appendicitis until some time after rupture has occurred. If you get a transmission of the heart and respiratory sounds as soon as the patient is taken with severe symptoms, the chances are that it is a perforated ulcer rather than any other disease.

Dr. Lucius E. Burch, Nashville, Tenn.—Dr. Harris stated that ulcers of the stomach belong to the surgeon, ulcers of the duodenum belong to the internist until certain complications arise. With this view I am entirely in accord.

The reason that gastric ulcer belongs to the surgeon is that nearly all of them are potentially malignant and they also have a tendency to produce surgical complications.

The diagnosis of a perforated duodenal ulcer in a typical case is easily made. The pain is so severe that it brings the patient to the floor or to the stooping position. Dr. Emmett emphasized the characteristic slow pulse. You also find the board-like rigidity of the abdominal wall which is pathognomonic of a ruptured viscus. It was brought out in the discussion that the breath sounds may be heard with a stethoscope placed over the abdomen in a case of ruptured duodenal ulcer or in perforation of the intestines. I have used this test several times and have not found it accurate. In my opinion it is only elicited in those cases where there is a large pneumoperitoneum.

The essayist has wisely said that the only operation that is necessary in a perforated duodenal ulcer is a simple closure of the ulcer. Gastroenterostomy is indicated only when the pylorus is blocked off.

I believe that bleeding duodenal ulcers, as a rule, are better handled by the internist than by the surgeon. Surgery here is unsatisfactory unless the bleeding ulcer can be found and excised. Duodenal ulcers are best treated by the internist before operation and if the surgeon desires to make his results complete the patient should again be referred back to the internist after surgical convalescence is well established.

I have seen in the last few years two cases of ruptured duodenal ulcers that did not come under my observation until forty-eight hours after the accident. In both of these cases the urine had a specific gravity ranging from 1.055 to 1.060. I am unable at this time to explain this interesting phenomenon.

Dr. G. V. Brindley, Temple, Tex.—There are but few abdominal conditions that so urgently demand immediate surgery as does an acute perforated peptic ulcer. Since this is true, an early diagnosis is exceedingly vital to the patient.

The intensity of the pain is an important factor in the symptomatology. Dr. Emmett states that one of his patients required 0.5 grain of morphine for relief. A patient who is taken suddenly ill with upper abdominal pain of such a degree, in a majority of instances has an acute perforated ulcer. The two diseases which should be first considered in a differential diagnosis are acute gall-bladder disease and acute appendicitis. We know that appendicitis does not begin with pain of such a degree. The pain of an acute appendicitis never requires 0.5 grain of morphine for relief within the first few minutes of onset. Also, the pain of an acute gall-bladder disease is different from that of the pain produced by perforation of an ulcer. With the gall-bladder pain the patient cannot be still. Often he will get up and walk the floor, though he may be cramped over. The pain in the patient with the ulcer is such as to make him want to be still. He does not move, for any movement usually intensifies the pain.

The present and antecedent history are very important in making the differential diagnosis. There is often a history of previous attacks of appendicitis, also attacks of gall-bladder disease, but there is never a history of previous attacks of perforating ulcer. The pa-

tient usually perforates only one time. The patient with an ulcer may give an antecedent history of a chronic peptic ulcer.

Dr. Emmett has discussed the treatment of the bleeding ulcer. I think it is a mistake to operate upon the patient with an acute bleeding ulcer. It is believed that the patient has a better chance if handled medically, that is, by rest, morphine and supportive measures. If such a patient gives a history of having had repeated gastric hemorrhages from his ulcer, then he has a surgical condition and surgery should be resorted to after he has convalesced to a reasonable degree from his acute hemorrhage.

Dr. W. W. Harper, Selma, Ala.—I should like to ask the essayist the rationale of hearing the heart and lungs by listening over the abdomen.

Also I thought all gastroenterologists had now stopped talking of duodenal ulcer and said peptic ulcer.

Our good friend, Dr. Burch, makes a clear distinction between gastric and duodenal ulcer. I should like to know if he makes that on x-ray findings.

I should also like to ask what part the vitamins are playing in the production of gastric ulcers. It seems to me from what I heard from gastroenterologists that they believe peptic ulcers are due to vitamin deficiency.

Dr. Crile states that he can cure in a short space of time intractable ulcers by clipping the twentieth nerve that goes to the suprarenal glands. I should like to know if the essayist had any experience with that treatment.

I do not know whether you can answer those questions or not. They say a wise man cannot answer what an unwise man asks.

Dr. Frank J. Kirby, Baltimore, Md.—The only way that we are going to arrive at the proper solution for the care of ulcers is by associating medical men with ourselves in their treatment. Operations for gastric ulcers do not cure gastric ulcers any more than operations upon the gall-bladder. They simply remove a partial cause, and the cases remain medical cases frequently for years afterwards.

So far as making the minute distinction between a pyloric and duodenal ulcer it is physically impossible, oftentimes, without the association of very, very careful x-ray diagnosis. Even with that I have seen ulcers overlap the margins, so that it was practically impossible to say whether you are dealing with a duodenal or pyloric at one time or the other.

Formerly, we have been so enthusiastic over curing our ulcer cases with different types of surgical operations that, in my mind, it was very much like the old fable of the fox. The fox had a very large, beautiful tail and he had it cut off and after that he went around and wanted all the other foxes to have their tails cut off also.

The symptoms of perforated gastric or duodenal ulcer are the symptoms of the rupture. The low pulse is associated in men who are strong and vigorous with shock. Pain which has existed for six or eight hours unabated in the abdominal cavity is an indication for surgery.

Many types of operation have been described. Why subject a patient to a very large partial gastrectomy when what is necessary is to put the ulcer at rest and give it an opportunity to heal? In the majority of cases, if one can loosen the duodenum and bring it up closely against the fundus of the stomach, he will get a very large, wide opening and do away with the action of the pyloric muscles. It is not necessary to do a large partial gastrectomy, which is very nice in the hands of those individuals who have a specific adaptability to that kind of work. The thing for the surgeon to do is that which gives the best results in his hands. It makes no difference what the operation is.

We do not know what the cause of ulcer is. We find many pyloric ulcers associated with other ulcers. I have photographed three and four ulcers in the stomach, so that the disease is not purely surgical. We must associate with us the internist, and until perforation occurs these cases should be very largely dominated by the medical man.

Dr. Emmett (closing).—Dr. Wilkinson has just said the reason that I asked him to open discussion on this paper was that I knew he differed with me on the subject of surgical treatment of gastric ulcer. For many years Dr. Wilkinson and I have disagreed upon this particular type of surgical therapy, but I am inclined to believe that our greatest difference is caused by Dr. Wilkinson's not listening to my papers. He has just suggested that I advocate doing subtotal gastrectomies upon all gastric and duodenal ulcers. What I attempted to say about this particular phase of the subject was that I feel that chronic callous ulcers of the stomach are primarily surgical problems and in my judgment subtotal gastrectomy more completely answers the requirement for this condition. When we practise any operation for the relief of ulcer of the stomach, we should be sure that our operation is going to give our patients the maximum amount of relief from gastric symptoms.

During the early years of my experience with surgery I was impressed with the fact that patients who were operated upon for gastric ulcers were rarely completely relieved of their symptoms and the operation which was most generally employed at that time was posterior gastroenterostomy. A large number of these early patients had been in the hands, prior to operation, of our medical associates. Such patients ordinarily were referred back to the internist and I am sure they were dissatisfied generally with the results of surgical treatment. In recent years I have been interested in the results of the stomach cases done in other institutions and have satisfied myself that the largest number of patients who were cured had been subjected to the more extensive operation of subtotal gastrectomy.

The operation of subtotal gastrectomy is not a supreme test of surgical skill as it has been generally pictured. This operation, in the hands of a well-trained general surgeon, can be done without a prohibitive

mortality. I, of course, realize that it is still associated with a higher operative mortality than the palliative procedures. I agree with the discussors of this paper when they state that gastric ulcer patients should be in the hands of internists before they are subjected to surgical treatment, and it is probably wise that they should be handled for a time by the internist from a dietary standpoint after operation. My experience with the patients who have had subtotal gastrectomies, however, convinces me that they are ordinarily so free of gastric symptoms that they do not require either dietary or medical supervision over a long period of time.

One discussor of my paper suggested that I had intimated that I thought gastric ulcer patients who were bleeding should have immediate surgery. What I meant to suggest about bleeding ulcer patients was that I thought that, after their hemorrhage was controlled, and they had gotten back to a normal physical state, they should be operated upon. I make this suggestion because I have seen the same gastric ulcer patient have hemorrhages repeatedly and I feel that, when an operation is done for this particular type of stomach lesion, the ulcer should be excised. It is unwise to expect a simple gastroenterostomy to cure this type of patient.

Dr. Seale Harris has mentioned the frequent recurrence of gastric symptoms in patients who have had pyloroplasties. We rarely do this operation.

I think that a posterior gastroenterostomy will cure 90 per cent of patients suffering with obstructive duodenal ulcers and I do not believe that we should expect a higher percentage of cures than 50 per cent from this operation in patients with gastric ulcers.

There has been waged a great controversy as to the relative frequency of occurrence of marginal ulcers. One of the Western clinics reports a 2 per cent occurrence of gastrojejunal ulcers following gastroenterostomy. One of the large Eastern clinics reports a 33 per cent occurrence of gastrojejunal ulcers following gastroenterostomies. Somewhere between these two groups of figures there must be found a true basis as to the actual occurrence of this complication. I am not in a position to state just how frequently the complication does occur. I wish to emphasize, however, its seriousness when it does take place.

Dr. Claybrook asked about our experience in being able to elicit breath and heart sounds over the abdomen in patients who were suffering from perforated ulcers. I have found these signs positive in a small group of our patients.

Dr. Claybrook misunderstood me about my statement regarding the association of perforation with the intake of food in the stomach. The majority of the patients whom we have seen with perforated gastric ulcers have sustained their perforation soon after eating or while the stomach was full.

The clinical picture produced by either a duodenal or a gastric ulcer is not sufficiently clear to enable us to localize the lesion without x-ray studies.

THE CORRELATION AND INTERPRETATION OF COMMON SYMPTOMS IN EAR, NOSE AND THROAT DISEASES*

By W. G. HARRISON, M.D., F.A.C.S.,
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For many of you, both the title and the contents of this cursory discussion will seem trite, probably trivial. Any one of a dozen titles would answer: "Significance of Old Symptoms in a Larger Setting," "The Crime of Carelessness," "The Sin of Laziness," or "Why Patients Grow Weary of Consulting Many Physicians."

In that alluring essay on the practitioner, urging a broader use of diagnostic aids and a closer integration of observed facts, Dr. Osler reminds us:

"Very little additional knowledge enables the general practitioner to grapple with a large proportion of the cases which in cities come under the care of the specialist. The question resolves itself into one of education."

And he might have added, sustained industry.

Another of Baltimore's famous teachers, Dr. W. T. Howard, was wont to say: "A diagnosis is a logical deduction from correlated facts," and he would often remind us that the sufferer had most of the facts; but something more than a modicum of mental ability and physical energy were required to correlate these facts, and real wisdom to attain the logical deduction.

At the 1928 meeting of the Kentucky State Medical Association, Dr. Stewart Roberts delivered an address on "The Larger Diagnosis," and among many other thought-provoking ideas one is especially apropos for our present purpose:

"The research mind is a rare gift, * * * * . The spirit of investigation is sensitive to all the signs, symptoms, facts and personalities of medicine," but there is "a quality, possibly greater than observation or research, the ability to interpret facts and conditions as they are," another version of the old adage, "Learn to know the difference between the main track and the side track;" and it is not always easy.

Herophilus, the Greek anatomist, wisely warns, "Extensive knowledge alone does not give us insight."

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The writer brings you nothing new, but hopes briefly to present some facts that show the "easy path to error," the inherent risks of snap diagnosis, one should say the implied diagnosis, but more especially to direct your attention to embarrassing misunderstandings tending to arise between patient, specialist, and the referring physician because of incomplete clinical histories, erroneous interpretation of these, or occasionally a carelessly implied snap diagnosis.

It is stated that a correct diagnosis may be made in 50 per cent of all cases from the correct interpretation of a good history (Strumpell), but not even 10 per cent correct diagnoses may be assumed from the presence of a single outstanding symptom. Even coughing up blood does not always mean pulmonary tuberculosis.

A revered professor of medicine, Dr. I. E. Atkinson, used to advise his students:

"Hesitate to prescribe for any complaint, acute or chronic, in a new patient without first trying to exclude the acute conditions, malaria, typhoid, the exanthemata, and such chronic diseases as lues, cancer, tuberculosis, diabetes, and kidney disease."

How wise his advice is, is indicated by the record of a few embarrassing blunders.

Too often it is the commonplace and obvious that we overlook, sometimes from carelessness, but often, we fear, from "indisposition to exertion." Mental lethargy is no respecter of persons.

Headache.—Headache is possibly our choicest blessing. Perhaps it warns of more dangers than does any other symptom. Its significance may be trivial or compelling, and it is amazing how valuable this single complaint may become if thoroughly analyzed and correlated with other things. If present off and on, but worse in the recumbent position, it strongly suggests organic brain disease, and if aggravated from midnight to daylight, one thinks first of central nervous system lues. If it is present on waking and disappears after early morning hours, defective nasal ventilation is suggested. If it occurs in the vertex of a young woman, pelvic disease is to be considered. If the headache begins in the latter part of the day, and is frontal and occipital in location, and especially if it be aggravated by near work, we confidently assume that it is of ocular origin.

Self-Prescribing.—A professor in a medical school, an ex-president of his state association, had severe afternoon headaches and he took non-habit-forming drugs for relief, covering a period of weeks, before consulting another physician. He was referred to an oculist for lenses, which offered little relief. After two more months he consulted a rhinologist, who corrected a nasal disorder blocking sinus ventilation. This aggravated all symptoms for a week, after which he was better for a fortnight, but his suffering returned with increased severity. Another month's delay and he phoned over for a good friend and fellow professor, a neurologist, who found all reflexes normal and the eye grounds negative, but advised a mapping out of the visual fields, which shed no light upon the case. Some weeks later he was too sick to leave his bed and his wife sent for a physician with the request, "Please forget my husband is a doctor and examine him as you would a pauper in the ward and find out why he has this pain." The next day the entire faculty knew their confrere had chronic nephritis of the contracted kidney type and could not return to practice. Six months had been lost, and for two reasons: first, because he was a physician who prescribed for himself; and second, because each of three specialists failed to consider the patient as a sick man, and in their quest for the cause of one symptom each friend forgot the need of the ordinary aids offered by a five-minute study of the urine. The loved professor died within a month.

Lues.—A man of seventy was referred for headache because "his nasal respiration is completely blocked." He suffered with severe nocturnal and early morning headache. He had extensive ethmoidal necrosis and polyps were packed in his nose like compressed dried figs in a box; but his nasal condition had no causal connection with his suffering, both being a long delayed manifestation of a luetic infection of forty years before. When his nose was freed of polyps and necrotic bone he enjoyed nasal breathing, but no relief of headache. He was advised to return to the referring physician for prolonged antiluetic treatment. This he declined to do, nor could any explanation convince him that the first physician had not blundered in failing to recognize the nasal disorder as a minor part of a more extensive disease. He knew the final diagnosis was decided by the blood test.

Diagnostic Blunders.—The next is a humiliating blunder of my own. A woman of twenty was referred for "treatment of sinus disease." The history of morning headache seemed to substantiate the provisional diagnosis of defective nasal ventilation, but careful examination gave negative results and a roentgenogram was made. This showed a foreign body somewhere near the cribriform plate. Only then did one get a history of a pistol shot wound ten years previously. The parents insisted that at least a part of the shattered bullet had been removed. The patient was returned to the family physician with the suggestion that he have her consult a general surgeon. Six months later she came again, saying: "Doctor, I still have headache and never have gotten any better, and my music teacher says it is from my eyes. Please see if it is." It was, and had a more careful history been taken this blunder would not have been made. At the former visit the girl had been on night duty as a nurse, not very busy but reading all night. While she suffered the so-called "sun-pain headache, worse in early morning and disappearing before 9:00 a.m.," it was from eye strain. She will always revere the medical judgment of her music teacher.

Epistaxis.—A woman of forty-five was sent thirty miles to consult a physician about recurring epistaxis, associated with sneezing. The nose was negative, but these were symptoms often associated with high blood pressure and contracted kidneys. A blood pressure of 195/90, with casts and albumin, meant returning home to her family physician, whom she berated. She regarded it as a useless journey and could not be convinced otherwise. Epistaxis is not rare in latent nephritis.

Within five years, three patients have been examined for ocular and four for nasal headache, where sufficient cause in each instance was found in the local condition to explain the symptom; but in all seven there was a more impelling cause suggested by a low specific gravity of the urine, an excess of urine, and small quantities of albumin with high systolic blood pressure. Three of the patients refused to go back to the physicians first advising them to see a specialist, because they resented the failure to make a urinalysis and blood pressure readings before referring them elsewhere.

The specialist is peculiarly prone to error. A college sophomore, the son of a general physician, was sent by his father to another state, seeking the best possible professional help for photophobia, eyeache, headache and recurring redness of the eyes. An ophthalmoscopic diagnosis of chronic retinitis was made and all study was forbidden. The student employed a tutor and remained in college till graduation, but never read an hour the last two and a half years of his course. He went a hundred miles each month to consult this noted specialist (a friend of his father) without showing any improvement. He was urged to select some life work that would not tax his vision. An accident carried him to another ophthalmologist who knew nothing of his former history and did not know the young man was the son of a physician. The new consultant dilated the pupils for a week and prescribed lenses, which corrected all the symptoms. But for his aid your essayist would now be raising cotton on an Alabama farm and criticising the Government.

Vertigo.—Until the last few years the patient presenting vertigo as the chief complaint was always unwelcome. Thanks to the Vienna methods, the vestibular tests are now much simplified. A definite proportion of these patients in the fifth and sixth decades suffer dizziness as a symptom of cerebral arteriosclerosis, or hypertension, and they are very prone to criticise the necessity of consulting several physicians to be told: "It is not serious, but may come and go for an indefinite period." It requires rare tact and graciousness to satisfy and comfort them.

Aside from a certain number of vertigos associated with definite cerebellar and ear changes, and eye muscle imbalance, we find many resulting from systemic disturbances such as gout, enemia, diabetes, uremia, lues, and cardiac diseases.

A man of thirty-nine, previously healthy, complained to his physician of dizziness and nausea. He was purged, took mixed bromides for a time, and enjoyed the ultra-violet rays for a fortnight. Only after developing tinnitus and acutely impaired hearing was vestibular complication suspected. With a negative urinalysis and normal blood pressure, lues alone seemed a possible causal factor. With a positive Wassermann we could ignore the negative history. Mercury for a month, followed by arsenicals, proved effective.

Cough.—Largely because of the educational campaign against tuberculosis, cough fetches many patients. It is a wise precaution and the cause is often obscure enough.

A prominent consultant of Colorado is credited with the statement that in one year he saw three patients from Alabama, sent West for tuberculosis, but each had only a relaxed palate or elongated uvula. What an expensive mistake! It is a natural one for a careless practitioner, but impossible for one who is diligent in getting a full history of the time of the cough and whether the position of the patient makes it worse or better. If in doubt of its potency in any specific case, one has only to apply a few drops of a 5 per cent solution of cocaine and then touch the pendulant part with a 10 per cent nitrate of silver. This generally checks the irritating cough for twenty-four hours.

A sensory branch of the pneumogastric nerve, called "Arnold's nerve," is distributed through a portion of the external auditory canal and, when irritated by impacted cerumen, produces a most annoying dry cough. The removal of the cerumen gives immediate relief.

The rarer enlarged lingual tonsil and the sensitive pharyngeal follicle are easily recognized if one looks and thinks. Post nasal droppings and an inflamed adenoid touching the posterior surface of the soft palate occasion many dry, hacking coughs. These may disturb sleep and impair digestion, but rarely cause a loss of weight and never a rise of temperature, and as a rule the sufferer is quickly relieved if he sleeps on his stomach.

If the sputum and physical signs are absent, a negative x-ray report should save an expensive sojourn to some tuberculosis sanitarium.

Earache.—Earache is by no means always produced by otitis media. A carious molar, tonsil retention, an ulcer near the base of the tongue, an ulcer on the anterior surface of the soft palate, are frequent causes, and all of these lesions can be seen if looked for. To quote again from the revered Osler, "We must look for what we do not see and listen for what we

do not hear." On the other hand, one sometimes sees otitis media in children with high temperature, perhaps convulsions, and spontaneous rupture of the membrana tympani, although no pain is present.

Diphtheria.—An acute unilateral nasal discharge, especially if sanious and offensive, nearly always means the presence of a foreign body or nasal diphtheria. Four cases of the latter have been seen by the speaker in two years, and three of the number had been sent for adenoid operations. It does not seem to be recognized generally by the profession that anterior nasal diphtheria and laryngeal diphtheria are often associated with a normal or but slightly elevated temperature.

One often sees acute follicular tonsillitis with temperature above 103°, and the relatives are anxiously apprehensive of diphtheria, but they reluctantly accept your diagnosis of diphtheria when the fever is slight. This is an error by no means limited to the laity.

Croup.—Catarrhal croup usually begins between ten and two o'clock at night and the patients are usually relieved of dysphonia by emetics and hot packs. If the hoarseness persists next day and there be the least difficulty of breathing, regardless of a normal temperature, a negative throat swab and a clean pharynx, and despite the absence of a membrane as observed with the laryngeal mirror, it is wise to assume a diagnosis of laryngeal diphtheria, true membranous croup. This attitude will save many young lives every year.

Diabetes.—A boy of nine, thin and pale, but enjoying a voracious appetite and never known to be sick, was treated for several weeks with tonics and urged to have his tonsils and adenoids removed. One day, while hurriedly eating, he accidentally bit his cheek and four days later was seen with a typical cancrum oris. Careful inquiry elicited a history of recurring boils off and on for a year. His urine contained much sugar. All remedies were futile in that preinsulin era.

A lady of forty-two was treated two months for nervous pruritus, involving sometimes the feet, the arms, and again the legs. She developed acute arthritis and was advised to consult some one to learn whether infected tonsils might cause her arthritis. She traveled fifty miles through the dust, rested overnight, and when first seen was most uncomfortable from itching of each lower eyelid. The tonsils were badly infected and their removal was advised, but fearing some systemic basis for the unexplained itching, the urine was tested. While albumin was absent, the specific gravity was 1.038 and there was much sugar. Tonsillectomy was postponed, the crypts cleansed, and she returned to her home, glad to have found the cause of her "itching misery, worse than the sore wrist."

Mastoid.—On each mastoid is a small lymph node draining the scalp above and behind. If the latter is infected, this node often becomes swollen, red and tender. Such a patient was recently brought to the hospital for an emergency mastoid operation. These cases are not extremely rare and may be most embarrassing for family physician and consultant.

Asthma.—We know little of allergy, anaphylaxis, or angioneurotic edema, but these conditions are sometimes so sudden in appearance, so rapid in action and potentially so disastrous, that one should be on the alert and bear them in mind. Severe urticaria with dysphonia, and cyanosis, once after aspirin, and twice after quinine, have been seen. One of the latter was most alarming. In the Finger Clinic of Vienna, where intravenous drugs are given every hour, they are never employed without having on hand a sterile hypodermic syringe containing 0.5 c. c. of 1-1000 adrenalin hydrochloride solution. This precaution once proved an essential blessing in my hands, in the case of a cyanosis which came on several minutes after a hypodermic of diphtheria antitoxin.

Salivary Gland Pain.—A rather common symptom and one often misinterpreted is sudden and painful swelling in front of the ear or under the tongue. It occurs while eating, causes great pain, and sometimes alarm. It is due to plugging of Stenson's or Wharton's duct with a small stone. As a rule these escape through the channel in two or three days and if not they may be easily removed by a lengthwise incision of the duct, which quickly heals.

Some English writer has said:

"So long as all of us were good general doctors all was simple and easy, but one day some enterprising physician found a hole in the head, the mouth, and he exclaimed, 'I like this place and I'll camp here and work.' Another and less fastidious found another hole, the nose, then another the ear; and along came some less discriminating brother and found another hole, the rectum, and exclaimed, 'Oh! I'll camp here and prosper.' Then another of a more investigating turn found the vagina and exclaimed, 'Oh! This is the field for me.' And as each became more skillful and prosperous in his new found territory he assumed a patronizing air of contempt for brothers dwelling in less secluded camps;" and so we have almost come to merit the criticism of Dr. Mayo: "A specialist is a man who knows more and more about less and less."

In one of his charming essays on the advantages of knowing the evolution and history of medicine, Dr. Sudhoff says we must "be on guard lest the green fields of clinical observation

become blighted by a dialectic mildew." May we suggest the idea that the first physician to be consulted take a real history and if he does not make a thorough examination for any systemic disease, he should see that the patient understands the limitation of his examination. Because one man is expert with the stethoscope is no excuse for refusing the aid offered him by an ophthalmoscope, and if inspection of the buccal mucous membrane is thought necessary, why overlook the ears and the nose? The test tube with nitric acid and copper solution is more helpful than a clinical thermometer.

Because one limits his therapeutics to diseases of the head is no excuse for his ignoring the aids offered by urinalysis, serology, the manometer and the blood count.

Quoting Osler:

"The various organs, the diseases of which are subdivided for treatment, are not isolated, but complex parts of a complex whole, and every day's experience brings home the truth of the saying, 'When one member suffers all the members suffer with it.'

"It is only by persistent intelligent study of disease upon a methodical plan of examination that a man gradually learns to correlate his daily lessons with the facts of his previous experience and of that of his fellows, and so acquires clinical wisdom. Nowadays it is really not a hard matter for a well-trained man to keep abreast of the best work of the day. He need not be very scientific so long as he has a true appreciation of the dependence of his art on science, for, in a way, it is true that a good doctor may have practice and no theory, art and no science. To keep up a familiarity with the use of instruments of precision is an all-important help in his art, and I am profoundly convinced that as much space should be given to the clinical laboratory as to the dispensary.

"He should know the practical application of the microscope, the ophthalmoscope, and the laryngoscope, and in these and other lines he should have proceeded to the stage in which he recognizes the limitations of his knowledge. Such a man, in general practice, should know a 'choked disc;' the examination for tube casts should be a familiar, everyday task; and he should be able to tell whether a vocal chord was paralyzed.

"The ordinary run of nervous disorders should be recognized; adenoid vegetations he would treat with the skill of a laryngologist; he would know enough not to tinker with a case of glaucoma; and though he might not diagnose a pus-tube from tubal gestation, he would (in this as in other details) have learned to know his limits and be ready to seek further advice."

It is not sufficient that we know, but our fidelity and industry in correlating and integrating this knowledge must make of it a practical art.

MYOPIA: CAUSE, PROGRESS, AND TREATMENT*

By MEYER WIENER, M.D.,
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In discussing refractive errors it must be borne in mind that we are dealing with a living organ and not with an optical apparatus. The normal may be considered as that which conforms to a certain physical definition, or as one adapted to a particular use. There is a difference of opinion as to what constitutes a normal even with reference to its physiological function. Landolt marveled, in view of the similarity at birth, not at the exceptional emmetrope, but that there should be so little variation at all. According to Schnabel, refraction implies not a definite index or axial length, but a harmonious both, only one must not consider structural harmony, but a good functional result.

Hirschberg regarded the hyperope as the normal individual, whereas Donders accounted for the hyperopic eye as an undeveloped one.

At birth practically all eyes are hyperopic. Fuchs found the infantile eye very short. If it had the same refractivity as the adult, it would be 24 diopters hyperopic, but the lens refractive power is twice as high. Schleich examined 300 infant eyes, finding them all hyperopic, varying from 1.0 D. to 8.0 D. German also found nothing but hyperopes, with a variance of 1.0 D. to 12.0 D. A summary of 2,400 eyes reveals 9 myopes, 21 emmetropes, and 2,370 hyperopes. While myopia is rare at birth, it shows a marked increase with advancing child life.

Of 4,614 eyes examined by Stocker in Lucerne, between the ages of 7 and 16 years, 8.4 per cent were myopic, 6.6 per cent hyperopic, emmetropic 85 per cent. This was taken without cycloplegic. Hess, examining the eyes of children in country schools, found 15.1 per cent myopic, 33.2 emmetropic, and 51.7 hyperopic. There is a wide difference in statistics, depending on who takes them and how and where they were taken. Dor found 15 per cent myopes in school children aged 10 to 11 years and 60 per cent myopes at the age of 18 to 19 years. In universities the percentages vary from 40 to 90, according to the investigator.

No accurate statistics are available among aborigines. Fox found 2 per cent myopes in the

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Carlisle school. Callan examined 457 negro children, finding 1.2 per cent myopes in the lower school; 3.4 per cent myopes in the high school. Of the remainder, 9.4 per cent were emmetropes and 90.6 per cent hyperopes.

In Congo negroes myopia is rare. Two and nine-tenths per cent of native New Zealanders were myopes.

Early in the Nineteenth Century it was established with increasing certainty that myopia was unequally distributed in different classes of population, increasing with the more highly educated; also that the refraction increases with years, the high school averaging a higher degree of myopia. With the advent of the ophthalmoscope came the discovery of fundus changes. Myopia was once thought to be a corneal affliction, but Donders upset this theory in measurements with the ophthalmometer.

Von Arlt believed myopia to be due to an increase in tension. Hess and Heine proved that it was impossible to increase tension with a maximum amount of accommodation. We know, also, in glaucoma the highest tension is in the morning, whereas tension decreases with use of the accommodative power.

Cohn and others believed it to be due to excessive accommodation. He thought that the choroid was pulled by the ciliary body. If so, why is the conus on the temporal side when the traction is equally distributed? Why should myopia develop in one eye only, or progress faster in one eye when the accommodation is equal in both? Or again, why should myopia increase in high degrees where the accommodation becomes practically suspended?

We might say the same thing regarding the theory of Donders and others, that it is due to convergence. Why does it develop in one eye?

Priestley-Smith's view was that the width of the skull was a predisposing factor. Seggel found, in the measurement of 3,000 children between 9 and 20 years, that whereas the average increase in the basal distance increased 1.61 mm. yearly, this average sank under 11 and over 15 and diminished during the period of greatest growth 0.93, 0.08, 1.02 and 0.83 mm.

It is readily conceivable that the basal width can be an inherited tendency, as well as increase in axial eye length, and in that way an association, but not necessarily a cause. We can also associate intelligence, pupillary distance, myopia and near work as developmental. Herein also arises the question of race and anthropological consideration.

Priestley-Smith's views are also incompatible with those of Cohn in that he urges the use of full correction in myopia in order to stimulate accommodation.

Stilling's theory had many adherents. He was not the first to call attention to the association of myopia with a low orbit. This was first observed by Von Graefe. Stilling was the first to blame the superior oblique as the cause by pressure on the globe from near work. If this pressure of the superior oblique in shallow orbits produces lengthening, why should the majority of cases cease to increase with finished growth? The mechanical relationship remains the same. Schmidt-Rimpler thought that low orbit might be the result of pull of superior oblique (how?) or that they might be due to the same condition. Pflueger, after a most careful and exact examination of a large amount of material, agrees with Stilling that the shape of the orbit has a definite influence, but that it is a race characteristic and therefore hereditary.

Levinson thinks myopia due to bending of the head, and endeavors to prove it by experiments on monkeys kept constantly with the head down. Some corroborated, others failed to confirm the findings. If this theory be correct, why do watchmakers, lace makers and tailors have less than musicians and typesetters, and why should it be at times one-sided?

Froelicher believed altitude was a factor since he found fewer myopes in the high altitudes than in the valleys. Exercise and endocrine function might play its part here.

Von Arlt claimed that during convergence the externus and superior oblique pressed on the vasa vorticosa, thus hindering the outflow of blood. Fuchs, disclaiming this, found no evidence of engorgement.

An attempt has been made by Tschering, Horner and others to classify various forms of myopia, but none has been satisfactory.

Volumes have been written about so-called school myopia. This was chiefly fostered by Cohn and his adherents. Seggel examined 3,078 scholars. He found a gradual increase in myopia from 16.5 per cent in the fifth grade to 65 per cent in the thirteenth grade. No one can deny the increasing number of myopes with advancement in school life, as well as increase in the degree of myopia in the higher grades. On the other hand, it must be borne in mind that this increase also corresponds with that period of life in which body growth is at its height

and in a period of great metabolic change. Again, the further one advances in school the less time he has for bodily exercise. This applies to both city and country schools.

Is it not peculiar that myopia begins at school age and is checked at a time when the greatest amount of close work is being done? It is a universally conceded fact that most cases begin at the ages between 11 and 15 and stop between 13 and 19.

It is very questionable that the actual use of the eyes *per se* causes myopia. Even Cohn had to admit, in discussion in Heidelberg in 1886, that myopia is seldom seen among seamstresses, tailors and watchmakers. Why should bakers and messengers be placed in a higher calling than plasterers; and why telegraphers and draughtsmen and sculptors on a lower (Tscherning)? Eldridge-Green thinks that the reason the laboring classes do not wear glasses is not that they do not need them, but that they are indifferent to slight, or even gross, defects in vision. He thinks stooping over causes an increased pressure (not proven) in the globe. He associates it with heavy lifting.

Roemer attributes myopia to the abnormally yielding nature of the posterior segment of the sclera which may be hereditary or due to a disturbance in metabolism in youthful sclera and of its relation to the general metabolism of the youthful growing organism. This fits in with the contention of Halben, who maintains that since the only large surface of the sclera free from pressure is the posterior hemisphere, it therefore has to bear the greater burden of internal pressure.

Loring held that the preponderance of myopia among Germans over Americans was due to poorer hygienic surroundings and less exercise. Gillet and Grandermont averred scoliosis of the coats of the eye to be the cause of myopia. When the coats of the eye are healthy myopia does not occur.

As to the theory that poor lighting tends to produce myopia, one might answer that school lighting is better today than ever before, but can we say that myopia is less prevalent?

Much has been written about the significance of fundus findings. Posterior staphyloma and conus are practically missing in young children with myopia. The degree of myopia in youth has no connection with the changes in the fundus. This occurs in later life and increases with advancing years.

Seggel reported a conus of ¼ disc diameter in a Chippeway Indian woman, emmetrope, with normal vision. Steiger believes fundus changes of definite importance in the cause of myopia. He thinks that hyperopic and emmetropic eyes having conus may have been originally much more hyperopic, and cites changes to normal from original +9.0 D. at birth. Macular and other changes coming on later in life are due to a degenerative process.

Statistics on inheritance vary not only according to those making them, but also to their methods of collecting them. Boehm claimed that 95 per cent of myopia was inherited and that near work was only an occasion. Juncken, in 1832, stated that

"Just as fathers short in stature will most likely beget small children, so will myopic parents have myopic children, and the reverse, and often through whole generations."

Notwithstanding the fact that it may not appear until the ninth to the fifteenth year, the factor of heritage remains the most important. Himley and Beger felt the same way. Also Von Arlt and Jaeger believed in the importance of the role of inheritance. Von Zehender claimed there was no question of the inheritance. Donders found it the exception to meet parents without myopia where several children have it. The predisposition is nearly always congenital and, in this case, almost always inherited.

Kotelmann, examining 24 families of teachers where both parents were myopes, found that 83.3 per cent of their sons were myopic.

The statistics of heredity vary from 2.7 per cent found by Cohn to 59 per cent discovered by Dor and 65 per cent by Greef and by Motais. Steiger was one of the firmest supporters of the theory of heredity. The hereditary disposition was ascribed by Schweigger to be a weakening of the sclera, by Von Arlt to a continuation of the growth of the eye in its long axis. Pflueger considered it a disposition anomaly in textural structure of the sclera, inherited or acquired; Emmert, a lowered resistance of the scleral wall, as did also He'ene and Koenigshoefer. Steiger agrees with Von Arlt that the disposition is nothing more than the future of the eye.

"The natural development of the eye must lead to the refractive condition to which it was potentially directed at conception."

As well as color of the iris can be inherited, why not refraction? De Condolle found that in children both of whose parents had blue eyes, 93 per cent were blue. Where both had brown, 90 per cent were brown. No proof has been

offered that inbreeding has any influence on heredity in myopia.

While there is definite proof of inheritance of corneal curvature, according to Steiger, he also tried to associate the inherited corneal curvature of one parent with axial length of the other. Oftener, he claims, corneal curvature and axial length come from the same source.

Kepler, early in the Seventeenth Century, recognized the optical properties of refraction, and Boerhaave, 100 years later, applied it to the science of ophthalmology and placed the cause of over-refraction in the cornea or optical axis. It was Donders who, with his accurate measurements, firmly established this with a greatly improved method of examination. Donders was not the first to discover myopia and hyperopia, but he was the first who understood how to set forth the science of refraction and accommodation, optical and clinical, in a clear including system, for all known questions, with the exception of etiology. In 1769, Guerin discovered that high degree myopic eyes had a longer axis than others.

Donders felt that myopia, once acquired, can be transmitted in the form of predisposition, and there, by renewed causes, developed to a high degree. Schnabel took issue with this view. If posterior ectasia of the sclera is inherited, then it cannot be carried through generation after generation any more than any other inherited eye disease. Loring gives as proof against inheritance of acquired conditions the strapping of feet of Chinese women and flattening of heads of certain Indian tribes.

The curvature of the corneal surface varies very little in the two eyes of the same person, but may vary considerably in individuals. However, according to Bourgois and Tscherning, the relationship of the corneal axis to the eye axis is constant, one to three. The average curvature was found to be 43.1 diopters, but the larger the size of the head, the flatter the cornea. Although the corneal curvature seems constant, the axis changes. With a corneal curvature of 48 D. we may have varied axial length from either hyperopia to myopia, showing no harmonious connection between corneal curvature and axial length. Babies are born with different weights and length. Why not different refraction?

Steiger explains variations in heredity. One may take a white and deep red flower and produce deep red and pale red. Children of emmetropes may be myopic. They may inherit it from a previous distant generation. Two parents bring not only their manifest characteristics, but their manifest and recessive. Development of myopia or hyperopia may be a matter of selection. Early folks required good sight for hunting and war. The ones with poor vision are eliminated.

Donders declared that if it were in his power to remove myopia from the world he would not wish it. The question arises as to which is the better eye for the educated or for the farmer. Darwin and Lamarck considered myopia as an adaptation to the requirements of culture. Musicians blowing horns develop emphysema. No one would claim that this makes the lung more adaptable to horn blowing. Near work requires excessive accommodation. The result of stimulation causes an adequate rise. Is this the case in myopia? Does the muscle of accommodation increase in strength as gymnastic exercises increase the size of muscles in general? Steiger asks this and also, if it is adaptability, why does not it affect high hyperopes most, as these are mostly in need? Myopia develops chiefly from emmetropes or mild hyperopes. Why not a matter of selection? According to Erisman, near-sighted lynx, falcon, deer, Indians, were eliminated by selection. Europeans find occupation and livelihood. Whereas in former years war eliminated the near-sighted, the opposite is true today. High myopes are not taken, and low degrees are placed in protective positions as far as life is concerned. It works in another way. Myopes not serving in the army or war find earlier permanent positions; and therefore marry younger. In certain occupations requiring close work, hyperopes are eliminated, not able to keep up. Thus selection may be responsible, not occupation. As to increase in the myopic population, there is no proof. Myopia was discussed by the Greeks and Romans. The statistics of Cohn assume something as new which is merely newly found.

The refraction of animals is most important in the comparative study of myopia. The important thing to bear in mind is not the refraction of each individual species, because every modern nature investigator will proclaim that each species has that type of eye that it requires, or did require. The important question should be, whether the eyes of a certain species exactly correspond, or whether the refractive curve in animals shows a variability as it does in man. Of this latter there is no doubt. There have been massive statistics on refraction of domestic animals, such as horses, dogs and cattle. Myopia

among horses varies, according to investigators, from 7 to 30 per cent. Of 969 horses examined by Riegel and Czermonsky, 10 per cent were hyperopic, 60 per cent emmetropic, and 30 per cent myopic. Four hundred and fifty cows examined by Lindman showed 2 per cent hyperopic, 29 per cent emmetropic, and 69 per cent myopic. Boden, in 100 dogs, found all to be myopic, varying from 2 to 6 D. Motais found that larger animals of prey born in zoological gardens and menageries are myopic rather than hyperopic, which he assumes exists in wild life. Johnson states that most wild animals, with few exceptions, are hyperopic. Only in the genus cynocephalus among the primates does myopia appear with regularity.

Dor, as early as 1868, stated that school does not produce myopia, but poor posture, stooping position can exaggerate an existing myopia. I have already quoted Roemer as regarding myopia to be either hereditary or due to a disturbance of metabolism in youthful sclera and of its relation to the general metabolism of the youthful growing organism. Gillet and Grandemont believed it to be the result of sclerosis of the coats of the eye and believe that when the coats are healthy, myopia does not occur.

Ince declared that myopia is not a disease *per se*, but is a manifestation of a universal congenital asthenia. This constitutional peculiarity of the sclera, the weakness of asthenic mesenchyme derivative, especially affecting the elastic elements of the sclera, permits stretching of the globe, and thus the myopic changes in refraction. He considers that in this scleral stretching another phenomenon of asthenia plays its part, namely: deficiency of epinephrine in the organism, in addition to an altered condition of the endocrine system in general. He considers that age and occupation play no part. He also lays stress on bodily habitus in the development of myopia. How he can disregard age as a factor when one considers the tremendous endocrine changes at the age of puberty is puzzling.

Roemer makes the statement that

"As there is no etiological therapy of myopia we ophthalmologists have to admit that we possess no means by which we can prevent with certainty the progress of myopia in a single case."

While this was partly true, fortunately we have reason at the present time to be more optimistic.

Some time ago, Pontius showed that the local action of epinephrine has a definite beneficial effect on the cornea in corneal ectasia. Since numerous investigators have proven that epinephrine produces a marked augmentation of metabolism of all tissues examined, even where the concentration used was as low as 1:200,000, it seems fair to assume that it is this effect on the cornea which produces the favorable results. The observations of Pontius have been confirmed by me both experimentally and clinically. Since sclera and cornea are developed from the same embryonic tissue, it can be easily conceived how the local application of epinephrine can have a beneficial effect on the softening or stretching of the sclera in progressive myopia. If epinephrine deficiency is a factor in the cause of progressive myopia it is only natural that one should endeavor to stimulate the secretion of epinephrine in these individuals. It is known that the secretion is stimulated by strenuous exercise. No one doubts the beneficial effects of exercise, especially strenuous, out of door variety, in the care of myopia. Diet also has an important influence.

While Ince found his cases of progressive myopia to be of the asthenic type, my experience is at variance. The worst cases were fat and well nourished, with a distatste for exercise or physical exertion. It is interesting to note that Schmidt-Rimpler found myopia to increase in 31.2 per cent of lazy pupils compared with 26.8 per cent of diligent pupils; Gelpke found 2.3 per cent myopia among diligent pupils, 10 per cent among average, and 13.1 per cent among lazy pupils.

It is questionable, in my experience, whether or not the use of the eyes for close work of itself has any influence on the progression of myopia. Draughtsmen and copyists often work at night in addition to their usual daily grind. Why are they not subject to myopia? If lighting plays an important part, why is not myopia on the decrease? Schools and factories and homes are certainly better lighted today than ever before. It is not infrequent to find, in the same family, one child who is not studious, who develops myopia while another more studious one will not develop myopia. I believe that age is a factor in the development of myopia, that it is usually an endocrine disturbance, and that there is often an inherited tendency to the development of an elongated eye. In a series of 99 cases of progressive myopia recently reported by me, 80 per cent seemed to be definitely influenced for good by local instillation of epinephrine, strenuous exercise and a well regulated diet. All of these patients wore full correction, but not all of them wore glasses con-

stantly. Priestley-Smith recommended glasses to stimulate accommodation. Foster was the strongest advocate of full correction and even over-correction. Jackson observed 24 fully corrected myopes over a period of three to ten years. Only 3 increased. He did not record whether they had been progressive before. Harlan saw 4 increase out of 12. Wadsworth, Risley, Randall, Roosa and many other authorities corrected fully. I believe, in addition, that all those progressive myopes who are not checked with the above mentioned methods should be carefully gone over for other possible endocrine disturbance, and this should include a basal metabolism test.

I have not mentioned the operative procedure. It is seldom used. I have, in cases where there was opacity of the lens in addition to the high myopia, removed the lens, but believe the cases should be selected where the lens is still clear on account of the danger of retinal detachment. I have obtained most satisfactory results in two cases of high myopia with congenital dislocation of the lens by removal of the lens in its capsule by the Smith method.

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DISCUSSION (*Abstract*)

Dr. W. R. Buffington, New Orleans, La.—You described 99 cases. What is your experience in 99 cases that had not had treatment?

Dr. Wiener.—There was some criticism of my paper, that I had no control cases. I consider that I had control cases because every single one of these cases (I had nearly 200, but I only took 99) was absolutely and without question a myope who had shown definite progression, which stopped immediately after the use of epinephrine. In the discussion at Detroit, Dr. Gradle answered that question when he reported 40 cases of definite progressive myopia which he had observed. To 20 cases he gave nothing except the regular routine treatment, told them not to use their eyes, and gave them full correction. To 20 other cases he gave epinephrine, and told them to use their eyes all they wanted, to take light exercise, and the results were just the reverse in the two groups. In the 20 controls there were only 3 that did not progress, whereas in the 20 cases given epinephrine, only 3 or 4 showed progress.

Question.—How long do you keep up this treatment?

Dr. Wiener.—I do not know, because this is experimental. We have used it eight years. Some have kept it up six months or a year and we tell them to use it three times a day; or if that does not suffice, to use it four times a day. Some patients have used it continuously for several years. We have never seen it do harm.

Question.—How do you check the condition?

Dr. Wiener.—We have them come back in a month, and if there is no sign of progress we tell them to come back in three months, and then every six months. If, at the end of a year, there is no sign of progress, we tell them to use the epinephrine only twice a day, then once a day, and then if we find they are not progressing, we tell them to stop altogether. After they have gotten down to once a day, if the myopia becomes worse we increase it again. We have some patients who have been using it four or five years, and we have one patient who uses her own judgment. Every once in a while her distance vision begins to get worse, but as soon as she begins to use epinephrine her vision comes back again. It is a very definite thing.

Dr. Phil M. Lewis, Memphis, Tenn.—Do you give full correction along with epinephrine?

Dr. Wiener.—Yes. But all of these cases, before they had epinephrine, had been given full correction, and all had been treated either by myself or some one else and told not to use their eyes much, the usual advice given by ophthalmologists to myopes. They had progressed, nevertheless, but only 20 per cent of them progressed with epinephrine. I think that is a good score for epinephrine, because we have never had so many checked, and none of my friends who have used it had had so many checked. We know that some cases will progress regardless of what one does. I do not think that every case of progressive myopia is due to lack of epinephrine. I believe that some cases are hereditary.

Dr. Buffington.—Have you made any study of the calcium in these cases?

Dr. Wiener.—No, we have not. But I want to emphasize my reason for using epinephrine, and that is that we know by experiment that it has a definite effect in increasing the metabolism of the tissues, not alone of the cornea and sclera, but of any tissue. If it increases the metabolism of the cornea, it should increase the metabolism of the sclera, and that is the reason I began to use it.

VASCULAR AND CEREBRAL COMPLICATIONS OF NEPHRITIS IN CHILDREN*

By HUGH L. DWYER, M.D.,
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Elevation of the blood pressure in acute hemorrhagic (glomerular) nephritis was originally explained on the assumption that the diseased and constricted glomeruli required a greater pressure to force the blood through the kidneys. This theory was abandoned when Katzenstein and also Senator showed that plugging up of the glomerular arteries or indeed removal of the kidneys produced no elevation in blood pressure. We now know that this form of nephritis is merely a local manifestation of generalized capillary disease. It is conceivable that those cases manifesting hematuria without other symptoms, that progress rapidly to recovery in a week or two are not accompanied by general capillary

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involvement. This type, usually termed focal nephritis, follows closely upon an upper respiratory infection and is said to involve only scattered areas of the renal glomeruli.

Many cases, however, show vascular changes early in the disease, this being manifested by contraction of the retinal arteries, spasmodic contractions and increased tortuosity of the capillaries in the nail fold and oscillations in the systolic blood pressure. Aldrich found in 129 cases of acute hemorrhagic nephritis that 73 per cent showed a variation of 20 mm. or more of mercury, between the systolic pressure taken at the height of the disease and the lowest reading during convalescence.

In chronic nephritis, involving the tubules as well as the interstitial tissue, changes in the walls of the arteries are frequently observed and arterial hypertension is nearly always present. Therefore, with the exception of the cases of tubular nephritis, we are much concerned with the vascular system in the management of nephritis.

From clinical observation it would seem that, in the majority of cases, arterial hypertension depends upon the distribution and stage of the renal disease. In others it may be transitory, depending in a great measure upon the degree of intracranial pressure produced by edema of the brain. In a third and much smaller group it appears to be primarily a vascular change, the renal and extra-renal arteries undergoing sclerosis with extremely high blood pressure and very slight renal insufficiency.

Observations on the blood pressure afford a means by which we can often foresee serious complications and elevated pressure is a prognostic sign of value in some cases of nephritis. When the pressure is permanently elevated, it denotes serious kidney disease.

The patient with acute nephritis is in constant danger of an attack of so-called convulsive uremia. This alarming condition is always associated with an increase in blood pressure, the hypertension being a compensatory phenomenon due to increased intracranial tension. It subsides with relief of this tension.

The chronic nephritic is in danger of, and in fact often succumbs to, an attack of true uremia from renal insufficiency which may be associated with marked hypertension. Volhard taught us to distinguish between true uremia and the cerebral complications of nephritis commonly called convulsive uremia. In true uremia the symptoms develop slowly in the course of chronic nephritis usually without a history of a recent acute infection. The symptoms depend upon renal insufficiency and the blood shows a retention of non-protein nitrogen, urea and creatinin. Hypertension may or may not be present and death usually occurs with coma and the deep breathing of acidosis rather than in convulsions. Treatment is usually of no avail.

CEREBRAL SYMPTOMS

The so-called convulsive uremia, or better termed the cerebral complications of nephritis, are characterized by headache, vomiting, visual disturbances, delirium, coma or convulsions. There is always an increase in systolic pressure, but no nitrogenous retention.

Volhard and Fahr state that a rising blood pressure is closely associated with the development of cerebral symptoms, but it is not known whether the hypertension is the cause of the cerebral symptoms or the result of some change in the brain. Blackfan and Hamilton conclude from their use of magnesium sulphate in the treatment of this condition that cerebral edema is the cause of these symptoms and that arterial hypertension is, at least partly, the result of brain edema. A systolic pressure of 130 in the presence of headache, drowsiness, nausea or visual disturbances is regarded by Aldrich as a state of threatened uremia.

Confronted with a case of acute hemorrhagic nephritis, we are concerned with conserving the capillaries from further damage by the toxins and from the rate of flow of the blood and the pressure within the vessels. The patient should be kept warm and in bed. Muscular activity increases the heart rate and consequently the rate of flow of the blood and can have no good effect on the damaged capillaries. Chilling of the body surface constricts the vessels in the skin, resulting in engorgement of the visceral capillaries, and this has a distinctly bad effect on the renal glomeruli. The administration of large quantities of water dilutes the toxins and thereby facilitates their elimination through the kidney. Restriction of proteins in the diet to the basic requirement and restriction of salt tend to reduce the work of the damaged kidneys to the minimum. After all this has been done we must be on guard for the cerebral symptoms.

Convulsions occurring in nephritis with arterial hypertension were treated with some degree of success by sedatives and hypertonic glucose solution. Twenty per cent solution intravenously in doses of 150 to 300 c. c. sometimes had a favorable influence on the convulsions. In 1925, Blackfan and Hamilton reported the use of magnesium sulphate intravenously. This

hypotonic solution had been used to reduce intracranial pressure in certain lesions of the brain and proved to be a powerful cerebral dehydrant.

To the patient who is able to swallow, 1 to 4 ounces daily, depending upon his age and the severity of the symptoms, is given by mouth in a 50 per cent solution. When the patient is unable to swallow, a 1 per cent solution is given very slowly in the vein. Blackfan states that it must be given slowly. I have given 180 c. c. during a period of thirty minutes. During the administration into the vein, blood pressure readings should be made frequently and the administration of the salt stopped when the pressure falls to normal. The dose given is about 15 c. c. per kg. body weight.

When blood pressure determinations and clinical signs warn of impending convulsions the oral administration of the salt should be started. In the experience of Aldrich these signs appeared in about 16 per cent of his cases of acute hemorrhagic nephritis. They may come early in the disease and may occur suddenly in a child who apparently is not very ill.

The following case report illustrates this point and the quick response to magnesium sulphate therapy:

A girl, aged seven years, two weeks after an attack of acute tonsillitis, developed hematuria. She was not very ill upon admission to the hospital, but two days later she developed slight edema of the face and feet, vomiting and headache. The urine showed macroscopic blood, little albumin and a few hyaline casts. The non-protein nitrogen of the blood was 32 mg. per 100 c. c. of blood. On the third day convulsions started and her systolic pressure was found to be 160. A spinal puncture yielded 10 c. c. of clear fluid under slightly increased pressure. Hydrated chloral was used per rectum and the convulsion subsided. Three hours later the systolic pressure was 164 and the convulsions returned. In the meantime she had been given 20 c. c. of a 25 per cent solution of magnesium sulphate subcutaneously without benefit.

A 1 per cent solution of magnesium sulphate was started into the vein while continuous blood pressure readings were made. At the end of thirty minutes 180 c. c. had been given, the systolic pressure was down to 130 and the child had regained consciousness. For the next twelve hours she was given one ounce of a 50 per cent magnesium sulphate solution by mouth every four hours. By that time there was marked improvement in the child's condition, the urine was passed frequently and in large amounts and the systolic pressure was 120. Two weeks later she was discharged from the hospital with no vestige of her trouble except a trace of albumin in the urine.

This case illustrates the rapidity with which the central nervous system is involved and the transitory nature of the condition producing these symptoms:

Helen, aged eight years, entered the hospital April 10, 1928, with "smoky" urine containing red blood cells, numerous casts and a moderate amount of albumin. She was known to have had nephritis for about one month following acute tonsillitis.

The blood showed 10,000 leucocytes, non-protein nitrogen 38, urea 18, and creatinin 2.4. During her stay in the hospital there were periods of improvement followed by exacerbations and during one of these periods of improvement the tonsils were removed. On account of the persistence of hematuria she was kept in the hospital.

August 30, nearly four months after admission, she went into convulsions. For two or three days preceding this there had been a decreased urine output, anorexia and restlessness, but no blood pressure readings were made.

At the time of her convulsion the non-protein nitrogen of the blood was 43 mg. per 100 c. c. At 9 p. m., during the convulsion, the systolic pressure was 180, the diastolic 100. At 9:30 p. m., after 180 c. c. of the magnesium sulphate solution had been given, the blood pressure was 170 and the convulsive seizures persisted. At 10:30 p. m. she had taken 280 c. c. of the solution, the convulsions subsided and the systolic pressure was 140. The salt solution was discontinued and two hours later the blood pressure was 130 over 80. For the next twenty-four hours she was mentally clear, took fluids freely and magnesium sulphate by mouth.

Then the blood pressure started rising and reached 170-100 when the convulsions returned. Intravenous administration was again started and the systolic pressure dropped to 130 with cessation of convulsions after 150 c. c. had been given over a period of thirty minutes. On the following day there was diuresis and loss of edema. She was removed from the hospital against advice September 4 with a blood pressure of 120 and very much improved.

There is experimental evidence that increased intracranial pressure causes arterial hypertension. The fact that magnesium sulphate brings about a cessation of convulsions with an accompanying drop in blood pressure is evidence of the cerebral origin of hypertension in these cases. As Blackfan contends, the reduction in pressure could not be explained by any direct effect on the vascular system. Nor could the favorable effect on the convulsions be explained or the possibility of the sedative action of the magnesium radical, the dose being very small. The most logical explanation is its powerful dehydrating effect on the edematous brain, with the resulting decrease of intracranial pressure.

Cases of glomerulonephritis that continue to show albuminuria with occasional exacerbations of hematuria and accumulation of urea in the blood present at autopsy inflammatory changes

in the glomeruli, exudative and proliferative, and finally hyalinization and obliteration of the glomeruli. With obliteration of the glomeruli comes a marked renal insufficiency and death in acidosis and uremia.

ARTERIOSCLEROSIS

In a small group of cases extensive vascular changes occur, a hyalin degeneration in the muscularis of the arteries and a general capillary fibrosis. Such patients show a thickening of all palpable arteries, "pipe-stem" radials with permanently elevated blood pressure, often to extreme degrees.

The following two cases illustrate extreme cases of hypertension as it occurs in children. In the first patient the increased blood pressure was probably secondary to disease of the kidney:

Wilma C., aged nine years, had Bright's disease four years following scarlet fever. She frequently had headache and attacks of vomiting were becoming more frequent. During the month before coming to the hospital blood reappeared in the urine. Her weight was 41½ pounds and her height 38 inches, considerably below the normal for her age. Radiographic examination revealed no noteworthy changes in the bones. The radial and popliteal arteries were sclerotic.

The urine showed macroscopic blood, much albumin, non-protein nitrogen 51, calcium 10.8 and phosphate 4.2. The blood pressure ranged between 230 and 222 systolic. The optic discs were swollen, the arteries narrowed and there were several pale atrophic areas, evidence of albuminuric retinitis.

Vomiting and headache were the chief symptoms with a reduction of phenolsulphonephthalein output to 15 per cent in two hours. The urine output became greatly diminished. She died in coma, and on the day of her death the blood showed non-protein nitrogen 116, creatinin 2.8, uric acid 6, and phosphates 5.4 mg. per 100 c. c. of blood.

At necropsy the heart was dilated, the left ventricle wall thickened and the epicardium studded with subserous hemorrhages. An old fibrinous pericarditis was present. The myocardium showed areas with loss of cross striations and pulling apart of the fibers, also considerable mononuclear interstitial infiltration. Several brownish yellow atheromatous areas were seen through the intima of the arch and descending aorta. Early fatty intimitis with a loosening of the subendothelial connective tissue and infiltration of lipoid was present.

The capsule of the kidneys stripped with difficulty. The cortex was pale and not clearly demarcated from the medulla. Both were quite indurated, suggesting an increase of fibrous tissue throughout. Degenerative changes were observed throughout all the glomeruli, they were broken up, vacuolated, and in some areas necrotic. Some of the capsules contained serum. The tubules were filled with stringy albumin.

Summary.—Chronic glomerular nephritis with juvenile aortic atherosclerosis.

In children presenting extreme and persistent elevations of blood pressure with arteriosclerosis the condition may be the result of a general vascular disease affecting the arterioles. The comparatively slight involvement of the kidney as shown by renal function tests and abnormal urinary constituents leads us to believe that the renal disease is secondary to changes in the blood vessels. Keith, Wagenor and Kernohan and also Amberg have reported cases of "malignant" hypertension in children in which it seems that the renal disease was secondary to a generalized fibrosis of the vessels.

The following case probably represents this type. It also conforms to the group of cases of malignant hypertension nephritis described by Swartz in which the principal clinical symptoms, aside from hypertension, were severe abdominal pain (angina abdominalis) headache and the passing of blood clots from the bowel.

Wilbur P., aged thirteen years, had meningitis when he was two and scarlet fever at three. "He had never been strong since the meningitis," although there was nothing in the history to indicate that he had nephritis.

In June, 1924, six months before entering our hospital, he had an appendectomy because of vomiting and abdominal pain. Nothing is known of the findings that led to the diagnosis or the condition of the appendix at the operation, except that it was known he had high blood pressure and albumin in the urine.

There was no relief from the abdominal pain nor the vomiting. At the start vomiting would occur only in the morning, but as time passed it occurred at any time.

He entered the hospital in December, 1924, with pain in the lumbar region, frequent urination, headache and was passing blood clots in the stools. The blood count was normal and showed sugar 110, non-protein nitrogen 30, urea 12, uric acid 3, and creatinin 1.4. The urine showed a trace of albumin. There was no edema. The phenolsulphonephthalein output was 40 per cent in two hours. Radiographic examinations were negative. The radial, popliteal and external carotid arteries were sclerotic. The systolic pressure was 230, the diastolic 184. He had attacks of abdominal pain and passed blood nearly every day. He developed a tremor and the headache was so severe that a general anesthetic was given on one occasion to induce relaxation and sleep.

Blood pressure during the following weeks showed a variation between 220 and 250 systolic and between 160 and 184 diastolic. The guanidin of the blood was determined as 0.46, or nearly five times the normal. Examination of the eye grounds showed a very indistinct disc margin with 2 diopters of swelling in both eyes. The nerve head was pale, the arteries narrowed and the veins tortuous. Many white radiations of atrophic stria were seen in the fundus. The findings were characteristic of an old albuminuric retinitis. For one month the daily volume of urine measured from 1,400 to 2,200 and the specific gravity was never more than 1.010 nor less than 1.006. He died five weeks after admission.

Necropsy showed the left ventricle hypertrophied and the mitral and aortic cusps slightly thickened. Yellow patches of atheromatous thickening were found in the arch and descending aorta and the iliac vessels. The systemic vessels were uniformly thickened. The left kidney weighed 120 gm. and the right 130 gm. The capsules did not strip easily. Numerous pin point hemorrhages were present beneath the capsule. The cortex was pale, the medulla congested. Histological examination revealed a widespread involvement of giomeruli and tubules and a marked increase in the connective tissue. The tubules had undergone considerable atrophy. The arterioles showed a marked hyaline thickening with narrowing of the lumen. The mucous membrane of the intestine was studded with minute hemorrhagic ulcerations.

CONCLUSIONS

Blood pressure determinations should be made frequently on children with acute hemorrhagic nephritis. A rising blood pressure in the presence of headache, vomiting or visual disturbances is a warning of cerebral involvement.

Cerebral complications in nephritis, characterized by convulsions without an accumulation of nitrogenous products in the tissues, the so-called convulsive uremia, are due to edema of the brain.

Magnesium sulphate solution by mouth and by vein decreases the cerebral edema, resulting in a disappearance of the symptoms of increased intracranial tension and a drop in blood pressure.

In nephritis of long duration a persistent elevation of blood pressure denotes serious kidney disease.

Extreme degrees of hypertension with arteriosclerosis in children may be of two kinds: (1) those secondary to disease of the kidney, and (2) those in which the renal disease appears to be secondary to a generalized vascular sclerosis.

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DISCUSSION (*Abstract*)

Dr. John A. Foote, Washington, D. C.—Nothing better illustrates that experience is fallacious and judgment difficult than the present status of the question of nephritis. Those who went to school twenty years ago were taught the theory of urinary secretion of Heidenhain. In recent years these teachings have been scrapped and the older theory of Ludwig has been revived and modified. We are no longer taught that the glomeruli act merely as filters while the convoluted tubules take out all the salts; but that the glomeruli filter out practically all of the urinary constituents and the convoluted tubules take back the necessary substances. So today, in kidney diseases, our theories of the physiology as well as of the pathology are somewhat clouded.

If we look at Dr. Dwyer's pictures of the pathology of the capillaries in the body it is very easy to understand why in portions of the body like the cranium, where there is no chance for expansion, edema should occur. Disturbances are found everywhere in the body when we have increased intracranial pressure. The treatment is directed toward relieving the edema.

As to the diagnosis of the condition, of course the blood pressure in acute forms of nephritis is important, especially in children. The only trouble is that, owing to conflicting opinions, one can not be sure just what the normal blood pressure is, although it is said that at the age of fifteen the normal blood pressure is from 65 to 115. So a decided rise in blood pressure or a clouding of consciousness is very significant, particularly when there is a decreased output of urea and creatinin.

One of the most prominent symptoms of increased intracranial pressure is vomiting. If the child is vomiting it is not only difficult to give fluids, but it is almost impossible to give substances which may be somewhat irritating by mouth. In that case the intravenous use of 1 per cent magnesium sulphate is very valuable.

Hamilton has warned against too rapid injection. About 2 c. c. a minute should be given, the blood pressure being watched meanwhile. The use of magnesium sulphate solution by rectum is also of considerable value.

Dr. John Zahorsky, St. Louis, Mo.—Even those of us who have enjoyed for many years a very large practice do not see many cases of nephritis, and they differ so in clinical characteristics that it is difficult to draw any conclusions about them.

Convulsive uremia is the commonest type and the one most often seen by the private practitioner. The ordinary hemorrhagic nephritis, as you know, gets well in a few weeks if we keep the patient in bed and treat him as we would any other sick person. They do not develop any dropsy or anasarca, or it is very slight. But we do have the child with moderate nephritis, apparently doing very well, who suddenly develops a headache and is vomiting, an acute case in a private home. Very often we do not get there until the child has had a convulsion. In any case of nephritis in the home following scarlet fever or streptococcic sore throat or ordinary grippal infection, the urine should be examined regularly daily. In all these cases we have been using daily blood pressure determinations in the home. If we get the child's blood pressure today and tomorrow find that it is up twenty points, that is very significant.

GLAUCOMA SURGERY*

By J. W. JERVEY, M.D.,
Greenville, S. C.

I presume it may be said that we each have our own peculiar ideas about glaucoma, and in a discussion of glaucoma surgery it is necessary that we understand first exactly what we mean when we say "glaucoma." Not that anybody knows exactly what it is, but we might say in a general way that not all cases of hypertension in the eye are glaucoma. Such hypertension may be well alluded to as glaucomatous, but by no means is every case of hypertension glaucoma, and by no means should we always attempt to relieve that hypertension by operative procedure. What I have reference to is the case of hypertension where we meet a few of the conditions to which Dr. Gill alluded in uveitis. We have frequently seen eyes that have been operated upon in cases of uveitis with high tension, usually with disastrous results. My feeling is that in those cases we are dealing with a glaucomatous situation, but not with glaucoma.

Intraocular hypertension with a shallow anterior chamber is a different proposition from intraocular hypertension with a deep anterior chamber; mechanically it is different. The mechanical situation with a shallow anterior chamber is one in which the intraocular diaphragm, ciliary body, iris and lens have been pushed forward from behind. Why? Because there is an increased tension in the vitreous, because the vitreous is waterlogged and edematous, and because the secretion tied up in the interspaces, which Park Lewis has shown us, is unable to escape through the natural channels of drainage. It cannot get through from one interspace to another. It cannot get from the vitreous chamber to the posterior part of the aqueous chamber because there is not enough filtration going on through the suspensory ligament. In those cases what we have thought is good surgery is this: in the case where we have a deep anterior chamber we may readily assume that the tension in all parts of the globe is the same, that there is plenty of filtration of secretion and therefore no displacement of the interior of the eye. Here the surgery must necessarily be done to bring about a reduction of tension, and my belief is that there is no one operation that has ever been devised for the management of glaucoma that can possibly be best adapted to every case. In other words, where an operation might be beneficial in a case with a shallow anterior chamber, that same operation would by no means be adaptable to a case with a deep anterior chamber. Ever since our good old friend, von Graefe, established the fact that iridectomy was an important procedure in the management of glaucoma, although he did not know why, it has been in use. Leber, and Weber and Knies showed the reason was that the canal of Schlemm was the natural drainage canal for intraocular fluids, and any operation opening the canal restored the tension. I have thought myself that that was the line to work on; many others do not think so. The operation of trephining might well be used in many cases of glaucoma, but there are reasons why it should not be used in some cases. That is an operation purely for the purpose of getting a permanent filtrating cicatrix of the eyeball. In other words, there is a permanent opening made by surgical entrance of the eyeball that will never close, if it is done according to Col. Elliott. I cannot think that in any case where it is not absolutely necessary to make a permanent cicatrix, this is a desirable thing to do. If the case can be managed by any operation that does not necessarily mean permanent damage to the eyeball, I think that is the operation to adopt. Can it be done? I think it can.

There is no use for me to dilate in this company on the different operations for glaucoma. You all know them much better than I do. You probably have the same objection to them in certain individual cases that I have, so there is no use discussing that. I am going to show you, in just a few minutes, a procedure that we have adopted and which we use for the reduction of tension in glaucomatous cases where we have a shallow anterior chamber. Where we have a deep anterior chamber I am convinced that a permanent filtrating cicatrix must be brought about, and to accomplish that either the Elliott or the LaGrange or iridotasis or one or two other operations which are not quite so popular can be used. But as I said, my objection to the use of them in all cases is that it is not necessary always to make a permanent opening through the coats of the eyeball. If the secret of reducing tension of the eyeball is by opening the canal of Schlemm, it can be done in a better

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way than by an anterior iridectomy. I cannot see how mechanically the latter will necessarily open the canal of Schlemm. You are working in front of the canal, and unless you are by traction on the iris uncovering it in other parts of the eye, certainly that iridectomy will not uncover the canal. But there is a way of doing it. That way is to make a linear incision two or three millimeters above the limbus (after dissecting up the conjunctiva as in the Elliott operation), going through the iris, taking then a little iris spatula, separating gently the iris tissue from the cornea and sclera, then passing a curved hook behind the iris and between the iris and lens, withdrawing the iris posteriorly and cutting it off. By doing that you are stripping the iris away from its adhesion over the pectinate ligament, and if desirable it is perfectly feasible with the same hook to pass from side to side over the margin of the scleral spur and gain a permanent opening of the canal of Schlemm. Of course, as I have said, we must remember that the hypertension is brought about not only by imperfect drainage, which may be the case in one eye, but in another it may be that it is brought about by hypersecretion, although the drainage may be perfectly normal.

I have been laughed at by some of my friends who say it is impossible to make an incision through that area around the limbus and go behind the canal of Schlemm and into the vitreous without seriously injuring the ciliary body. Spalteholtz' anatomy, which I suppose we all recognize as being the most accurate extant today, says that it is a perfectly simple matter to pass the thin blade of a knife from just above the limbus posteriorly to the canal of Schlemm, straight down into the center of the vitreous, in this case merely touching one or two of the ciliary processes, which of course would do no particular injury.

But now we have this in addition. On the left is a section showing the ciliary body in an eye that has acute congestive glaucoma, with iris adhesions covering up the canal of Schlemm and the spaces of Fontana. There it is obviously impossible to pass a knife without going through the ciliary body. But after that case has become chronic, and after the tension has existed for some time in the posterior, or rather the vitreous chamber, the eyeball is different. Invariably the result of prolonged hypertension is atrophy of the ciliary body, and therefore operative procedure may be done without risking this structure in any wise by this incision into the eyeball.

You hear men say that operations are to reduce tension, relieve pain and secure increase of visual acuity, and yet the most valuable thing is forgotten, and that is retention of the visual fields. That is much more important than acuity of vision.

In two or three cases where I was convinced that I had a chronic, long-standing simple glaucoma, where I was convinced that the fault lay in the waterlogged vitreous and the inability of the vitreous secretions to get out, I performed the modified operation. I plunged a cataract knife straight through to the middle of the vitreous, worked with a side to side movement for about two or three millimeters, and in both cases I had a perfectly satisfactory result, which I do not think could have been gotten in any other way.

DISCUSSION (*Abstract*)

Dr. Meyer Wiener, St. Louis, Mo.—I do not know how you put the hook in. Do you separate the ciliary body from the attachment to the sclera?

Dr. Jervey.—Yes; or rather I separate the root of the iris from the sclera.

Dr. Wiener.—Do you put the hook in and grasp the iris from behind? But you must make a hole first. After you have separated the ciliary body from the sclera you have to make a hole through the iris; and then bring the hook out?

Dr. Jervey.—Yes, I make an incision, but it is easy to pass the hook through without incision because the tissue is very soft.

Question.—Do you use a keratome to make the incision or a cataract knife?

Dr. Jervey.—I use a knife that Dr. Tooke of Montreal designed for the operation of splitting the cornea. The sharp edge is on the end.

Question.—Do you make a more or less gradual entrance through the sclera, or do you plunge right through?

Dr. Jervey.—A gradual entrance by repeated little cuts.

Dr. J. N. Greear, Washington, D. C.—How about

lens changes following the operation? Is there any injury to the lens?

Dr. Jervey.—We have never had any lens changes attributed to the operation.

Question.—How far back of the limbus is the scleral incision?

Dr. Jervey.—About two or three millimeters. The actual limbus is about 2.5 mm. in front of the iris angle and when you go 3 mm. beyond the limbus you may still not be back of the iris, but you are beyond the canal of Schlemm. It is not a cyclodialysis; it is an iridodialysis.

Dr. E. H. Cary, Dallas, Tex.—When do you use that operation? You have acute inflammatory glaucoma and glaucoma that is rather acute non-inflammatory, in which you have no previous history of glaucoma or tension. Would you use that operation in that type of case, in the congestive case?

Dr. Jervey.—Yes, I have used it in three or four instances of that sort, with very satisfactory results. But I want to make it clear that I do not consider this operation applicable to any case of glaucoma with a deep anterior chamber, for the simple reason that the whole object of this operation is to open the canal of Schlemm.

Dr. Cary.—Did you do this before there was sufficient tension to produce atrophy of the ciliary body?

Dr. Jervey.—It does not matter, because I do not consider that I touch the ciliary body. I do not make a plunge into the vitreous in the routine operation.

Question.—Why is it necessary to pass the hook behind the iris since you have already loosened it?

Dr. Jervey.—Because it is much easier to withdraw it that way, whereas if you put forceps in you are much more likely to do some damage to the lens.

Dr. Wiener.—There is a type of congenital case that always results in secondary glaucoma and blindness. What would you do with a case of that sort?

Dr. Jervey.—Personally, I have never seen a case that did not result in total blindness, and Prof. Fuchs said he had never seen a case.

Dr. W. R. Buffington, New Orleans, La.—What is your experience with operative procedures on negroes? Have you any negroes in your practice?

Dr. Jervey.—I gave up my clinical practice a few years ago and have only my private practice.

Dr. Buffington.—Negroes do not respond to operative procedure. The Elliott trephine as you do it on white persons, an operation that is successful in 75 per cent of cases, on negroes is a failure.

Dr. Jervey.—Dr. Bruns, of New Orleans, wrote me not long ago that he had done a trephine operation on one of these cases (negro) and was not successful. He followed it by this operation and got a satisfactory result.

RETROPERITONEAL CYSTS*

By H. R. SHANDS, M.D.,
Jackson, Miss.

Before this Section, at the Atlanta meeting in 1916, the author reported a case of chylous cyst of the mesentery. A few years later another case of this kind came under our care.

This second case was in a young man, sixteen years of age, who had received a crushing injury of the abdomen at the age of four, after which his abdomen was always larger than normal, and in the previous few years had gradually become greatly distended. At operation a very large chylous cyst of the mesentery of the jejunum, containing a gallon of chylous fluid, was enucleated. Since operation both of these patients have remained well.

These chylous cysts are really retroperitoneal in location, but occur between the leaves of the mesentery of the small intestine. When small or reasonably large they possess marked mobility. The origin of these cysts, though, is entirely different from the retroperitoneal cysts under discussion in this paper.

These true retroperitoneal cysts to which attention is now directed occur behind the parietal peritoneum lining the posterior abdominal wall, either to the outer side, immediately behind or to the inner side of the ascending or descending colon. They arise most often from persisting strangulated nests of the Wolffian body. The fluid contents of these cysts are often clear and limpid like spring water. Hemorrhage may have taken place into the cysts, then the fluid will be blood stained or chocolate colored, depending on the amount and time of the effusion of blood within the cyst cavity. These cysts have a thin wall of fibrous tissue and are lined by one layer of epithelium. This lining of epithelium distinguishes these cysts arising from the Wolffian body from those which have their origin from the primitive lymphatic sacs.

These primitive lymphatic sacs are four in number: the jugular sac, located in the neck; the retroperitoneal, in the abdominal cavity, and two posterior sacs, in the pelvis. In later fetal life the lymph nodes and vessels develop from these primitive sacs. Cysts developing from these early lymphatic fetal sacs have no epi-

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thelial lining, just as the hygromata of the neck are not lined by epithelium.

Cave states:

"It is from these two sources that most of the large and interesting cysts arise. However, it is worth noting that some of them have grown from cell inclusion. The dermoid or teratomatous cysts are composed of a thick wall containing teeth and hair and grumous material. Blood cysts, as the name implies, are large cystic collections of extravasated blood in the retroperitoneal space due to injury of blood vessels in this location. Parasitic cysts reach this area either by going directly through the intestinal wall into the retroperitoneal space or by the blood stream."

CASE OF RETROPERITONEAL, SEROUS CYST OF WOLFFIAN ORIGIN

Mrs. H. S. F. was referred by Dr. DeBerry, of Hazlehurst, Mississippi, May 27, 1930. She was a healthy looking woman, age forty-nine, whose last menstruation occurred in September, 1929. Her chief complaint was aching in the lower right side of the abdomen. The family history was of no consequence. She had had the usual diseases of childhood, four normal labors and one miscarriage. Her general health, appetite and digestion had always been good. There was no history of urinary disturbance until the present trouble, which began three weeks before with pain over the bladder and frequent urination. This was relieved by medical treatment. At examination she had a little dead aching in the lower right side of the abdomen. The bowels were regular, the appetite variable lately and she had some gas on her stomach. Her weight was 146, blood pressure, temperature and pulse were normal; no abnormalities were found in her chest. A tumor the size of a large grape fruit was found in the hypogastric region above the pubis. On vaginal examination it was found that the cervix was not diseased. The tumor filled the pelvis and reached to one inch below the navel. This tumor was diagnosed as a fibroma of the uterus and surgery was advised. A catheterized specimen of urine contained no pus, no blood and no sugar.

Next morning, under spinal anesthesia, the abdomen was opened and a large fibroid, the size of a cocoanut, was found attached to the right horn of the uterus. The right ovary was somewhat bound down and contained several cysts; the ovarian vessels were quite large, their diameter being more than one-half an inch. As she had passed the menopause, both ovaries, tubes and uterus were removed. The appendix, which was chronically diseased, was removed; the gall-bladder was explored and found normal. A more thorough exploration of the abdomen was then made and a large retroperitoneal tumor found in the upper and right quadrant of the abdomen.

At first this was thought to be a large hematoma which had developed from the ligation of the distended veins in the right ovarian ligament. The veins, however, had been carefully ligated and the ligatures had not slipped, and a further examination showed the tumor to be a cystic mass, five or six inches long, four inches wide and fully three inches thick, which lay behind the thickened posterior peritoneum and extended from the brim of the pelvis, just internal to the base of the cecum, and along the inner side of the ascending colon upward to the hepatic flexure. It was entirely retroperitoneal, firmly adherent to the posterior abdominal wall and immovable, although cystic.

Enucleation of the cyst was instituted by incising the peritoneum one inch to the inner side of the ileocecal valve and extending the incision upward four or five inches. Through this incision the peritoneum was dissected from the anterior half of the thin-walled cystic tumor. At this stage the cyst was ruptured and a quantity of bloody, serous fluid aspirated. Dissection was then continued until the entire capsule of the tumor was removed.

From the above description it can be seen that this cyst lay exactly along the course of the right ureter, so care had to be taken not to injure the ureter. The nutrient artery to the tumor was located at the upper pole and to be sure this was not the ureter this artery was exposed for an inch or more and definite pulsation was seen and felt. After the blood supply had been ligated, a small cyst was found at the lower pole of the larger tumor, which was enucleated with some difficulty. This cavity was loosely packed with a long strip of iodoform gauze, the intestine being protected from the gauze by a rubber dam, and the incision in the posterior peritoneum was closed by suture.

Pathological Report.—Fibromyoma of the uterus; chronic ovaritis; simple cyst; cyst wall, lined with epithelium; no evidence of malignancy in any of the specimens.

The making of a correct preoperative diagnosis of a retroperitoneal cyst must be next to impossible, for with a rather thorough review of the literature no case was found in which a correct diagnosis was made before operation. The condition is so rare that even a busy surgeon rarely sees over one or two cases in a life time. A number of the larger clinics have reported to me that they had observed no case of true retroperitoneal cyst. The cysts are of slow growth and are innocuous except for the pressure caused to the surrounding structures. Gradual and most often painless enlargement of the abdomen is the presenting symptom. On examination an abdominal tumor is found which can often be diagnosed as cystic. With the use of all modern aids in diagnosis, including the x-ray and cystoscope, the exact location and origin of the tumor has not been determined. Most of the tumors have been thought to be of ovarian origin. A few interesting cases are reported in which infection had taken place within the sac, and the patient presented the picture of acute abdominal infection with a tumor mass. These cases have been operated upon under the diagnosis of an appendiceal abscess, the mistake in diagnosis being discovered only after the ab-

domen was open and the mass found to be a cystic tumor behind the peritoneum.

Certain very interesting solid tumors occurring in the retroperitoneal space, such as lipomata, fibromata and sarcomata, are also very difficult of correct diagnosis before operation. However, these solid tumors occur more frequently and have somewhat more characteristic symptoms than the cysts. Quite a number of solid tumors have been correctly diagnosed before operation.

As in the case above reported, the presence of the cyst, though rather large, often has not been suspected until the abdomen has been opened for another condition. This would appear to be an added reason why it is worth while occasionally to present for consideration a review of this subject. It is somewhat disconcerting to "flush" a good sized retroperitoneal cyst during the course of another operation.

While the diagnosis is difficult, the prognosis is good and the treatment rather easy. The cysts, if not infected, are usually loosely connected to the surrounding structures and are readily enucleated, so that the posterior parietal peritoneum can be snugly sutured. If there should be persistent oozing, a drain or pack can be left and safely brought across the peritoneal cavity by being incased in a rubber tissue drain. If it appears to be difficult or dangerous to attempt enucleation, simply suturing the posterior parietal peritoneum to the anterior and draining the cyst cavity to the outside has proved to be permanently curative in all the cases found and reported as thus treated. Of course enucleation, when possible, is the treatment which appeals to the best surgical judgment. There would necessarily be more danger of postoperative obstruction in cases treated by drainage in the above manner. Even the cysts with seriously infected contents have recovered following drainage instituted as described above. In infected cysts it would be bad judgment to attempt enucleation, as the cyst wall would almost certainly be ruptured and a serious and probably fatal infection in the retroperitoneal areolar tissue would occur.

Some surgeons advocate a lumbar incision for various retroperitoneal tumors. The anterior incision is best, for through it a much more thorough exploration can be made and the surgical maneuvers more safely carried out.

DISCUSSION (*Abstract*)

Dr. Irvin Abell, Louisville, Ky.—We have had two lymph cysts of the mesentery, in neither of which was the diagnosis made before operation. One, in a ten-year-old child, had as a result of torsion, produced mesenteric thrombosis and such extensive gangrene of the gut that the operation was of necessity limited to an exploration. The other occurred in an adult woman and was successfully removed with the overlying segment of intestine. We have had no simple retroperitoneal cysts. The cysts that we have seen have been of two types: solitary cysts of the kidney and cysts of the pancreas. In both locations the history, physical findings and the utilization of the various methods of laboratory examination, particularly pyelography and gastrointestinal x-ray, will usually furnish a fairly accurate diagnosis. The solid tumors coming under personal observation comprised lipomata, myxomata, embryomata and sarcomata. I do not think one need feel chagrin in being unable to recognize the character of certain retroperitoneal growths. As a matter of fact, until the growth attains some size the mere recognition of its presence is not an easy matter. The physical features most commonly noted in retroperitoneal growths are three: they are most frequently situated in the lateral halves of the abdomen; they push the colon forward, in some instances displacing it laterally or mesially, and they are more or less immobile. The elimination of the kidney and intestinal tract as sites of the tumor by appropriate x-ray studies has a definite diagnostic value. The malignant tumors sooner or later show nodulation, fixation and metastasis, together with evidence of inroads on the health and strength which permit but one interpretation. When the clinical features indicating advanced malignancy are absent, the patient should be given the benefit of exploration, since this affords the only opportunity of dealing with such tumors, granting that their location and attachment are such as to make them amenable to surgical removal.

Dr. Shands (closing).—In my student days a man came from Canton, Mississippi, to New Orleans with a large retroperitoneal growth which Dr. Matas diagnosed as sarcoma. He was given a full course of treatment with Coley's toxins. Under this treatment the tumor gradually disappeared and several years afterward this patient was still living in good health.

I also know of one case which was diagnosed in Rochester, Minnesota, as retroperitoneal sarcoma which was apparently cured with enormous doses of radium. This was a cowboy from Texas who hit Rochester just before Christmas when the most of the radium was not in use. A year later he was punching cows on a ranch in Texas.

In looking through the literature one is impressed when every now and then a case of retroperitoneal sarcoma is reported in which unexpectedly good results have been obtained from the use of heavy doses of radium.

SOME FUNCTIONAL DISORDERS OF UROGENITAL ORIGIN*

By H. W. E. WALTHER, M.D.,
New Orleans, La.

Urinary disorders of functional origin have definitely established themselves as a group of ailments that merit serious consideration. There are still many, however, who believe that most sexual neuroses are but figments in the imagination of "abnormal" patients and therefore deny them any attention. It is not my purpose to mislead you into believing that this presentation can add much clarity to so vexatious a problem as this one seems to be. I can advance no original ideas in the management of these ailments. Little that is new has affected these types of urological disorders. Still it is felt that this group of genito-urinary complaints merits our attention and that a summary of the more common affections will not be considered amiss.

Some of the every day disorders that group themselves under the heading of functional disorders of urogenital origin are: (a) suppression; (b) retention; (c) incontinence; (d) impotence; and (e) sterility. Supplementing the two principal sexual neuroses, there have been added brief comments upon (f) prostatorrhea and spermatorrhea, (g) nocturnal emissions and (h) premature ejaculations.

SUPPRESSION

In discussing anuria (or suppression) it is necessary to go further than simply to state that the cause is either secretory or obstructive in origin. We must recognize and evaluate those influences, extrinsic as well as those that lie within the urinary tract.

We recognize that form of suppression that accompanies the uropathies such as the nephritides and the nephroses; where lowered blood pressure persists; in thrombosis of the renal vessels; and, in nervous reflex inhibition as is sometimes observed after a nephrectomy or in operations outside the urinary tract. It is in this group that we find the prognosis most grave.

Of the obstructive lesions, intrinsic in character, calculi, tumors and strictures go to make up the major instances of suppression observed.

Having established the fact that the patient's bladder remains empty over an abnormal period of time, cystoscopy and x-ray investigation are promptly resorted to in an effort to localize the cause.

In stone cases, particularly where bilateral calculi are found, too much time should not be lost where cystoscopic treatment fails to bring about relief. Pyelotomy or ureterotomy are often life-savers.

Where the anuria is of secretory origin, deep heat to the kidneys by means of diathermy has proven effective. Large amounts of fluid, given by mouth, intravenously, by hypodermoclysis, by duodenal tube and by proctoclysis are most valuable.

Decapsulation, once a much lauded procedure, is rarely of assistance in this type of renal pathology. The recent vogue of sympathectomy procedures upon kidneys and ureters is not without its ultimate dangers to the uropoietic mechanism and should be practised cautiously until such time as its worth has been demonstrated beyond question.

In the obstructive types of suppression, ureteral catheterization can be depended upon to give prompt relief provided the obstruction can be passed with a catheter. Ureteral catheterism plus the injection of adrenalin solution into the kidney has given me startling results in a few instances after everything else failed. Years ago some one mentioned to me the value of adrenalin in these cases, but I received the suggestion with much skepticism. The rationale of adrenalin injections to stimulate renal secretion has never been explained, so far as I am aware, but it may be of service and should be remembered.

RETENTION

Vesical retention due to prostatism, calculus or urethral stricture has received sufficient attention and, therefore, need not be dilated upon here. Of those functional disorders most commonly credited as producing vesical retention we recognize: results of trauma or disease on the spinal cord, cerebral tumors involving the cortical bladder centers, paresis of the detrusors, any pressure upon the bladder neck from without, rupture of the bladder and vesical prolapse. Lesions other than these are encountered, but those just enumerated are among those most frequently observed.

Any one of the various neuroses producing complete retention may present serious prob-

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lems. Probably in no other group of bladder lesions is the urologist more concerned as to just what course to pursue. The age of the patient, his status in society, the degree of nerve involvement elsewhere and whether or no the retention is accompanied by marked urinary infection, all these factors lend weight in coming to a decision. If, after a period of conservative management (by means of intermittent or of indwelling catheter drainage plus the use of internal and local urinary antiseptics) the case shows no evidence of restoration in the act of normal urination, more active measures are demanded. Just how much we can expect from electrotherapy, physiotherapy, hydrotherapy and similar agencies, is always a question. Obviously, in luetic infections, both intravenous and intraspinous therapy may work much good. Frequent consultations with a neurologist should be insisted upon in order to determine, if possible, the progress made. Whether or not we should drain such bladders by suprapubic cystotomy still remains a mooted point. Some years ago, following our experiences in the World War, those who should be in a position to know advised firmly against cystotomy in bladder neuroses with complete retention. More recently other observers recommend that cystotomy drainage be done promptly in such cases, claiming that in this way alone can involvement of the kidneys be avoided. In our very limited experience with this type of case we have practised both methods. Not every patient with such a lesion will consent to operative relief, and even where such consent is obtained, it still remains a matter of judgment as to whether periods of intermittent catheterization along with periods of indwelling catheter drainage are not to be preferred to permanent suprapubic drainage.

Should the retention be caused by influences extrinsic to the bladder such as the pressure from tumor-like processes, surgical removal of the cause invariably brings relief. In like manner, rupture of the bladder or prolapse of this viscus demands surgical intervention. In that type of bladder prolapse frequently encountered in elderly women, where surgery seems too precarious an undertaking, indwelling catheter drainage frequently gives material relief.

Of the many points in diagnosis and treatment of this group of vesical disorders, none seems in a greater state of chaos than the matter of intravesical, instrumental manipulations. To use or not to use the cystoscope here is the question. The writer does not propose to decide so weighty a matter. It would appear rational, however, not to rush in blindly and cystoscope such cases unless some special indication demands it. Cystograms lend themselves here as a valued clinical aid to diagnosis without subjecting the patient to much danger or discomfort and not infrequently furnish information that cystoscopy would not reveal.

INCONTINENCE

By incontinence is usually meant that state in which adults are unable to control the escape of urine from the bladder. When the condition occurs in children the term enuresis is applied. Some patients come to observation in which the urinary incontinence is noted only during daylight hours; others have only nocturnal distress.

It is obviously necessary to differentiate bladder overflow from true incontinence. The former is usually alluded to as dribbling and is observed in advanced prostatism with an overdistended viscus, while in the latter condition the bladder is perpetually empty.

We are familiar with incontinence in acute vesical trigonitis (chemical or bacterial); in tuberculosis, stone or foreign body of the bladder; in loss of sphincter control following operations at the bladder neck (as that following prostatectomy); in some types of bladder paresis (tabes, spina bifida); and, in congenital deformity of the urethra or neck or the bladder (epispadias, cleft in vesical sphincter).

Where practical the cysto-urethroscope should be employed to study the region of the internal vesical sphincter and trigone in an effort at detecting inflammatory processes, foreign bodies, injuries, trabeculations or anatomic defects. In infancy such instrumental examinations are rarely satisfactory, even where feasible. In children, however, with the aid of the newer miniature cystoscopes, visual study of the bladder interior is absolutely practical. If the pediatricians would avail themselves more frequently of consultations with the cystoscopist in resistant enuresis, cases that either defy the usual modes of therapy or by their obscure etiology challenge detection, many patients might be saved much discomfort.

In those cases showing no demonstrable lesion of serious import, we have found no remedy so effective as bladder instillations of silver nitrate solution. Even in small children, such instillations, given through a No. 5 F olivary tipped ureteral catheter, using solutions of from 0.5 to

2 per cent strengths, often give instant relief. Not infrequently it is observed that one such instillation will suffice, but they can be repeated weekly without ill effect. The personal hygiene of the case must be gone into thoroughly with the mother and, provided the child be old enough, the patient's cooperation will go far in bringing about satisfactory results.

Incontinence in adults may provide real difficulties, both as regards diagnosis as well as treatment. With the aid of the cystourethroscope a thorough visual study of the vesical neck and trigone should reveal any pathological condition present. The entire posterior urethra should be included in this instrumental search for the causative factor. In non-tuberculous infections, the usual local treatment plus deep urethral dilatations with the Kollman dilator often suffice. Tuberculous cystitis is largely secondary to a renal or genital tuberculosis and it therefore becomes necessary to treat the primary focus. Foreign bodies as well as stone in the bladder demand removel by suprapubic cystotomy. Litholapaxy is inadvisable in this group of cases.

For those cases presenting evidences of surgical injury or in deformity of the neck of the bladder, various plastic procedures have their advocates. My own experience in repair surgery of the bladder neck has been most limited. In the three cases in which I deemed it necessary, failure to improve matters accompanied the effort.

IMPOTENCE

An individual incapable of performing satisfactorily the sexual act is usually considered impotent. He need not necessarily be sterile. Every sterile male is not impotent. The failure, however, of the male to perform normal coitus is obviously a handicap to fertility. Various conditions influence sexual vigor. The duration of potency in individuals varies widely, some showing a diminished vigor at 45, others retaining full the sexual faculty at 70.

Unquestionably, sexual excesses, masturbation and the scars of uncured venereal maladies are important factors in the impotence cases encountered. Abnormalities of the genitalia, congenital in origin, account for others. The type not infrequently met with, termed psychic impotence, furnishes the urologist with many difficult problems. It is not possible, in a presentation such as this communication pretends to be, to enumerate all of the types of impotence that have attracted attention. We know, for example, the unfavorable sexual reaction to mental fatigue, pre-occupation, fear, anger, grief, disgust and the like. It is necessary, however, that we determine, in a given case, whether the cause be organic or psychic.

Having evaluated the patient's physical makeup, both by the usual physical aids to diagnosis and by instrumental study, we must further inquire into his sexual ideas, habits and history. The hygiene and psychologic viewpoint of the patient must be gone into thoroughly. Encouragement must ever be the urologist's main forte. To put such patients upon a sexual fast means much.

STERILITY

Sterility still furnishes us with a problem often difficult of solution. Formerly it was fashionable to put all blame for childless marriages upon the shoulders of the wife. Such an attitude cannot be upheld at present. The female of the species is wiser today. Barren marriages, for which the husband is at fault, have been estimated anywhere from 25 to 70 per cent. Certain it is that sterility is more common in the male than in the female. Provided there be no anatomic or pathologic deterrent to the exodus of semen from the male genitalia, it becomes imperative that repeated examinations of fresh condom specimens of ejaculated material be examined for motile spermatozoa. It is still commonly taught that bilateral epididymo-orchitis whether due to mumps, gonorrhea or other processes, is certain to render the individual sterile. More than once I have received rude shocks by having such patients, in later years, introduce me to a wife and happy family of children. I believe that perhaps as many as 33 per cent of patients who have had bilateral epididymitis can, in later years, impregnate females. Obesity, diabetes and chronic alcoholism invariably sterilize in time. Medical men must not forget the ravages that repeated exposures to x-ray exert in impairing the vitality of spermatozoa.

Again it must be said that sterility, in its broadest aspects, cannot be evaluated in a short discourse. The above mentioned phases are but a few of the many that could be discussed. Nevertheless, the writer feels that many cases of sterility in the male can be helped by the urologist. Particularly is this true of those cases presenting evidences of uncured lesions either in the prostate, seminal vesicles or urethra.

PROSTATORRHEA AND SPERMATORRHEA

Prostatorrhea and spermatorrhea are daily confused one with the other. Our confreres in general practice should be set right in this regard. The family physician is often consulted relative to a pearly drop seen in the mornings upon rising or after stool, and he does not always know just how to explain it. Whereas prostatorrhea is quite common, spermatorrhea is rather rare. Although irritations at the bladder neck such as vesical calculus, or rectal diseases, may account for some prostatorrheas, the condition is usually the sequel to gonorrheal infections, masturbation or sexual excesses. A thin discharge originates in the accesory glands, both genital and urinary, and consists of the secretion from the prostate, Cowper's glands and the glands of Littre. The larger gland, the prostate, furnishing the major volume of the fluid, has given the condition its name. In these cases the musculature of the prostate is in so relaxed a state that every constipated movement of the bowels squeezes out a few drops of opalescent fluid. Urination may produce the same thing. The condition can be perpetuated by masturbation, sexual excitement without gratification and withdrawal during coitus. A symptom rather than a disease, it is harmless and should cause patients no worry were they to accept such corrective measures indicated. The diagnosis is easily made by microscopic study of the fluid. Such smears will show the elements of prostatic secretion plus evidences of infection, if they be present.

NOCTURNAL EMISSIONS

Nocturnal emissions are an endless source of worry to many of our patients. In those practising continence, bi-weekly emissions are considered by most authorities compatible with health. Such a state is often associated with dreams, but may occur in deep sleep without apparent rhyme or reason. When, however, such pollutions occur several times a week the individual so affected may consult his medical advisor to learn the cause. In every case true involuntary seminal emissions must be differentiated from prostatorrhea. It is a common experience to have patients relate the increased frequency of emissions while taking large quantities of water, particularly before bedtime. Sleeping on the flat of the back plus an overdistended bladder predisposes to such emissions. Obviously, a hyperesthesia of the posterior urethra and verumontanum, frequently encountered in cases of uncured gonorrheal conditions, will explain the persistence of such a symptom. After all, nocturnal emissions are usually only a symptom of some urogenital condition that has been neglected. Searching out the cause and administering the proper therapy brings prompt relief.

PREMATURE EJACULATIONS

Premature ejaculations should be grouped with those symptoms commonly brought to the attention of urologists by patients ignorant of the fundamental laws of sex hygiene. It is usually the price that must be paid for abusing the sexual organs, indulging in abnormal sexual practices or allowing some psycho-sexual complex to get the better of one. The advice is always the same; correct the fault or treat the pathologic process.

This brings us to a pivotal point in the query: what can we do for these patients suffering from so-called sexual neuroses?

Any number of competent observers in our field agree that over 60 per cent of all sexual disorders are due to some peripheral nerve irritation emanating from the posterior urethra. In considering these posterior urethral involvements we must remember that many cases of sexual aberration owe their continuance to infections of the prostate and seminal vesicles. That lesions of the spinal cord and hypogastric plexus bring about various abnormalities of sex function cannot be questioned, but that they furnish a minor element in practice, most experienced observers will concede.

In my experience prostatitis and seminal vesiculitis account for many cases presenting themselves for relief. By the established methods of diagnosis and treatment directed at these structures many patients can be cured. Consistent and efficient therapy is given in the form of massage to these structures, deep urethral instillations, dilatations with sound or dilators, physiotherapeutic procedures, intravenous administration of supportive agents, the prescribing of effective tonics, and educational propaganda in the dissemination of knowledge regarding sex hygiene, will do much in bringing such patients back to normal.

Lesions of the verumontanum, in my opinion, are a prominent factor in the perpetuation of sexual neuroses. American urology in particular has added valuable contributions to our knowledge of pathological conditions of the deep urethra. The advent of the cystourethroscope and the pan-endoscope have opened up vistas

undreamed of a quarter century ago. Posterior urethroscopy, carried out under water distention, is today a more or less routine procedure with every progressive urologist.

Of the many types of lesions involving the verumontanum only the more common ones need be enumerated here. Chronic congestion of the veru with or without hypertrophy of the structure is most frequently observed. Granuloma, papilloma, polypi, cysts and congenital malformations are also met with.

The two most popular methods of treating the pathologic veru have been by instillations and topical applications through the endoscope. Either procedure will prove satisfactory in a certain percentage of cases. There are instances, however, when they fail. Several years ago I became interested in applying the high frequency spark to the veru, using water distention of the posterior urethra with the aid of a cysto-urethroscope. In some lesions I find the d'Arsonval current best, but in the majority of instances the Oudin current (being less penetrating and therefore less destructive) serves most admirably. Although no originality is claimed for this method, I desire to emphasize it at this time because it has received so little attention in the literature. Very little current is necessary; the gaps on the machine are stopped down to a point where but the finest spark is obtained. Most applications require but a second or two in order to attain sufficient cauterization. Within ten days this treatment can be repeated, if found necessary. By the use of a foot switch the operation can be carried out in the office without extra assistance. By exercising ordinary care, using an effective local anesthetic and steading both cysto-urethroscope and electrode, no danger nor pain should accompany such manipulations. I believe that the high frequency spark has a definite place in treating lesions of the verumontanum and commend it to you for consideration.

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DISCUSSION (*Abstract*)

Dr. Bransford Lewis, St. Louis, Mo.—I heard a discussion some time ago in which somebody opposed the use of a retained ureteral catheter in obstruction of the ureter in pregnancy. I want to put myself on record as being in favor of the retained catheter under such circumstances. I feel that in some cases I have saved the lives of women who in pregnancy had an obstructed ureter, fever and sepsis, with 105° and 106° temperature. I introduced a catheter of good size and let it stay there, and the fever subsided and the patient was serene the next day. I have kept that catheter in as long as necessary.

As to vesical retention, I have successfully treated a little girl 12 years old who could not open her sphincter, and could not evacuate except through a catheter. We put in a catheter for a while, followed that with urethral dilatings and she recovered.

Lately we have been studying a case of neurotic retention in a woman about 30 years of age, who was not relieved until we dilated her urethra with a uterine dilator.

We have been using that uterine dilator to an extent that I would not recommend to others. But she is a satisfied woman.

Dr. Walther discussed the question of suprapubic drainage in connection with use of the retained catheter. I would certainly use a catheter and not think of making a suprapubic opening.

Dr. H. J. Farbach, Louisville, Ky.—Probably the most important neuroses affecting the bladder are those of luetic origin. When we consider that about 80 per cent of all tabetics present, at some time or other, vesical symptoms that require relief, and that very often bladder symptoms are the initial symptoms from the patient's standpoint, we should never lose sight of this possibility in any patient consulting us for urinary and sexual disorders.

These symptoms appear most often during the "prostatic age," and in more than one instance I have obtained a very important lead by watching a patient's pupils while taking a history of his urinary trouble. In most instances the diagnosis is easy, but occasionally a case presents with either a lack of, or confusion of, evidence that renders a positive statement very difficult.

It has been my unfortunate experience to have encountered some cases of so-called asymptomatic tabes. They have been subjected to intensive intraspinous and constitutional medication. The results of treatment in this type of case have made of me a bitter opponent of it. Whenever it takes five or six spinal fluid examinations and as much as 5 c. c. of fluid to obtain a weak positive reaction, in my opinion, this is not sufficient grounds on which to recommend intensive intraspinous treatment, if there is no other undisputed evidence of lues.

My observation of treatment so recommended and carried out has been that it did not change the clinical aspect of the case, but did add other disagreeable symptoms to an already unhappy situation.

Retention and difficulty of urination are the most frequent complaints, although if vesical sensation has been destroyed, overflow dribbling may be the cause of the consultation. As to instrumentation, no hard and fast rule can cover all cases. If the distention is not very annoying and dribbling of clean urine has begun, these patients can often be trained to empty their bladders with fair satisfaction. Some of these bladders will become greatly distended, but suppression of urine or rupture of the viscus need not be feared. The patient should, of course, be under constant observation. With dribbling, the distention gradually reduces, and in a few weeks satisfactory emptying has been accomplished. If there is any question as to damage to the kidney by back-pressure, blood chemical analysis will answer it promptly. In cases where the nitrogenous content is above normal limits, the "hands

off" policy should be abandoned and a bladder decompressing apparatus installed, still hoping to institute automatic emptying later on.

In cases where there is irritation, rather than loss of sensation, some instrumentation must be resorted to. Where infection is already present one hesitates less, but extreme caution must be taken in any manipulation. Vaccines and urethral installation should precede vesical irrigation through a catheter, whenever practical, even if the case presents a clean urine. Cystoscopy gives valuable information; the presence of a vesical bar or median lobe, calculi or papilloma, may explain the irritation, removal of which relieves most of the discomfort. Proper specific treatment ultimately relieves the great majority of these patients.

Acute retention occurs at times, due to very slight disorders. After alcoholic or sexual excess, acute pharyngitis or influenza, the patient notices first some difficulty in urination and then is unable to void at all. At times this picture is on the background of a history of urethral stricture. A medium-sized instrument is passed with very little difficulty and the patient voids normally after the single emptying.

The man who cannot pass his urine has an annoying situation to contend with, but his plight is not so embarrassing or socially difficult as that of the man who cannot hold it. No satisfactory urine-collecting apparatus has ever been devised. A man in active life will resort to almost anything to correct the odoriferous condition. Oppenheim, with a strip of the rectus abdominalis, and Deming, with the gracilis, have formed a new sphincter that proved satisfactory. This, of course, appeals most strongly to the individual in active life.

In my experience the next large group of these functional disorders is the one that includes the individual from 35 to 45 who comes in with some rather indefinite urinary symptoms spread out over a background of fear of impotency. In the majority of instances, the conditions presented have been precipitated by what the individual thinks was a sexual failure. We have all encountered him, and perhaps because of some very personal experience we may be prone to treat his fears with levity. But it is not a laughing matter to him. His horizon has suddenly shrunk and contracted until there is not much left to live for. There is no question of the part psychology is playing at the time, but the physician who expects to cure these patients by suggestions, aphrodisin, or something to raise or lower blood pressure, is going to be disappointed and see his clients go elsewhere.

As Dr. Walther has stated, a large percentage of these cases have a pathological condition in the seminal vesicles, prostate or posterior urethra, or a combination of all three. The symptoms elicited may include premature ejaculations, prostatorrhea or spermatorrhea, sterility or impotency of varying degree, or, on the other hand, they may be chiefly urinary; but, as a rule, you find the combination of sexual and urinary symptoms with the patients enlarging on the sexual disturbance. Urinary and rectal examinations with the microscopical study of expressed secretion generally give a lead to the proper diagnosis.

Today we know that a negative venereal history does not exclude infections of these tissues. In fact, nonspecific infections account for most of them. It is true that papilloma, cysts, calculi and malformations of and in the posterior urethra may be the sole cause, but experience proves that most often posterior urethral disease is secondary to lesions in the vesicles and prostate. Cysto-endoscopic diagnosis is valuable, but one must not be misled into treating endoscopically a lesion caused by infection of the vesicle and prostate until these primary conditions are corrected.

Our brethren in the North and East are devoting much of their time and talent to catheterizing and treating through the ejaculatory ducts. In my opinion, this work is still in an experimental stage and not to be adopted as a routine procedure.

We see fads for the treatment of these conditions come and go: intraprostatic injections, diathermy *per urethram* and *per rectum*, and many others equally alluring in argument and failing in results. The chronicity of these conditions is what leads us into the temptation of trying new theoretical propositions. The old tried and true procedures of massage, dilatation, heat, instillation and endoscopic application may be slow, but they obtain satisfactory results in most cases and are resorted to finally in all cases.

Dr. Joseph H. Smith, Memphis, Tenn.—The neuroses and psychoses caused by genito-urinary tract disease is an important subject and cannot be covered in a few minutes.

I have just operated upon a man who has been extremely nervous and suffering from frequent micturition and some impotence and a neurotic condition. Upon endoscopy, I found a very resistant congenital stricture at the neck of the bladder. Dr. Caulk will be glad to know that I removed this in my office with his punch. The mental condition of this patient has improved.

Patients of this type should receive our sympathetic and careful attention.

Dr. T. M. Davis, Greenville, S. C.—We must keep in mind the patient as a whole. In cases that do not present definite pathological conditions in the urological tract to account for their impotence, it is well to investigate the endocrine functions. Many of these individuals have hypothyroidism and hypopituitarism or both. I am not sufficiently versed in endocrinology, and refer all cases without definite local pathology to account for their condition to an internist for a thorough examination. It is surprising the effect that thyroid extract and anterior pituitary will have on some of them.

Dr. Rex E. Van Duzen, Dallas, Tex.—May I ask Dr. Walther what he used to instill in these cases? Silver and massage make some of them worse. Recently I have tried oil of gonvenol, and in cases that were not tuberculous I thought it helped. I know of nothing that will relieve them completely.

Dr. Thomas D. Moore, Memphis, Tenn.—I should like to bring to your attention a condition which might be erroneously classified as bladder neurosis, because of

the clinical symptoms of a marked cystitis with a negative urinalysis and normal cystoscopic data. Two such cases have recently been observed by me, both young individuals, in whom marked diurnal and nocturnal frequency of urination was the chief complaint. Repeated urinalyses were negative. It was discovered that these patients were consuming an excess of coca-cola, averaging from six to twelve glasses a day. The symptoms of cystitis promptly disappeared in both instances when this beverage was withdrawn. Their trouble was probably dependent on over-stimulation due to an excess of caffeine. At any rate this is the only explanation I can offer. It is important that such cases should not be regarded as bladder neuroses, with which they might be easily confused. Inquiry into the habits of the individual regarding the consumption of beverages containing caffeine may yield important information bearing on the complaint.

Dr. Nelse F. Ockerblad, Kansas City, Mo.—There is one class of cases of which Dr. Walther did not speak. So-called menopause bladder is a distinctly endocrine affair which comes on frequently about the age of menopause or earlier where the sex organs have been removed or disturbed. This class of patients constitutes an ever-increasing number. Almost every one of us urologists has been guilty of dilating the ureters of these patients for pain in the side and in the bladder region and treating them for bladder disturbances, when actually they had a neurosis which was due to an endocrine disturbance. This type of case is frequently sent to us for diagnosis and treatment.

Dr. John R. Caulk, St. Louis, Mo.—Dr. Walther did not discuss the treatment of the neurogenic bladder as a result of central nerve disease. We have to discriminate between the acute lesions, that is, gunshot wounds or traumatic lesions, and the old chronic lesions resulting from spinal cord trouble. The most beautiful results in urology are from the treatment of the tabetic bladder.

Systematic decompression with draining and starting of the urine in cases of high residual urine is of great benefit.

Dr. W. J. Wallace, Oklahoma City, Okla.—I wish to agree with Dr. Caulk about the tabetic bladder. These patients should receive active antisyphilitic treatment. Large doses of potassium iodide should be given. Mercury should be given over a long period of time. I find intraspinal treatment very efficacious.

Dr. Walther (closing).—I am still wedded to silver nitrate for instillations. I use 2 per cent in cases where that strength is not found too irritating. I do not use anything after the instillation.

Dr. Van Duzen.—What do you do for painful prostate?

Dr. Walther.—I have been giving rectal suppositories; that is about all, for as long as the irritation exists. But in prostatitis and in vesiculitis we are dealing with a purulent discharge, as in gonorrheal infection. After we have cleaned it out, pyridium, serineum or mallophene will do good.

CHRONIC SALPINGITIS*

By JOHN W. TURNER, M.D.,
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Apologies must be offered for introducing this subject before an assembly of gynecologists, as it is impossible to do more than touch the surface of a condition that dominates the whole field of gynecology and influences the conduct of the gynecologist toward every case coming to him.

Chronic salpingitis is a term referring to a distinct clinical entity and should not be confused with the term chronic pelvic disease, which, being a generic term, should not be used to designate a clinical entity, but only as a comprehensive phrase referring as well to an ovarian cyst or to a fibroid uterus as to tubal disease. Chronic salpingitis is the dominant condition in diseases of the female pelvis. It is usually associated with a chronic endometritis and cervicitis. It is occasionally associated with a chronic ovaritis, in which case the ovary has usually helped to seal up and close off the end of the tube. It is associated with a chronic pelvic cellulitis so rarely as to permit us to say a chronic pelvic cellulitis never occurs except where an acute cellulitis has terminated in an abscess which escaped drainage. As these associated conditions do not affect the course and treatment of chronic salpingitis materially, they will not be considered in this paper.

Chronic salpingitis may be classified into three groups, according to the offending organism, namely: gonorrheal, post-puerperal, and tuberculous. As the course and treatment of the disease vary with the characteristics of the causative organism, this classification appears to be a logical one. Gonorrheal salpingitis, which results from the extension of the infection from the lower portions of the genital tract upward into the tubes by continuity of mucosa, is the initial type of infection in approximately 60 per cent of the cases. As the gonococcus is not persistent and conducts its campaign in a storm or a series of battles rather than by siege, tending to die out after the initial campaign, it is questionable whether gonococcal salpingitis should be classified among the chronic tubal infections. The process is of short duration and the plastic exudate thrown out during the acute

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process usually undergoes resolution and is absorbed, leaving a completely restored tube capable of resuming its functions. If secondary infection takes place the activity of the process is prolonged, the exudate becomes organized and the tube becomes permanently occluded with the development of a chronic salpingitis.

Salpingitis caused by the gonococcus, uncomplicated by secondary infection, is the most benign type of salpingitis. The patient does not experience pain so severe, nor fever so high as is found in cases due to invasion by the streptococcus or staphylococcus. Under proper treatment the infection runs a shorter course. It does not become chronic. Curtis stated that it is impossible to isolate the gonococcus from patients who have been free from fever for a minimum of ten days and who do not show gross evidence of infection, and that persistently active tubal disease is therefore not a chronic gonorrheal condition with acute self-originating exacerbations, but a fresh infection from without, a fresh extension upward from a chronically infected lower genital tract, or a non-specific infection. It is my personal opinion that routine smears taken from the cervix of all cases of acute salpingitis at the beginning of the disease and submitted to bacteriological examination will convince the most skeptical that a gonococcal salpingitis is a comparatively benign type of the disease. It has been my experience since bacteriological examinations have been made of the discharge from all cases of acute salpingitis appealing to me for treatment that Curtis' statement is absolutely true. Gonococcal salpingitis is an acute condition, a self-limited disease, responding promptly to proper treatment and rarely, if ever, becoming chronic.

Post-puerperal or non-specific salpingitis is usually due to infection by the streptococcus, although the staphylococcus may occasionally become the causative organism. This type of salpingitis is more virulent in its onset and more persistent in its course. It tends to become chronic and permanently to damage the tube. The chronic salpingitis seen so frequently is unquestionably due to infection with organisms of this group. The patient suffers from general lassitude, fatiguability, chronic backache, menstrual irregularity, pain in the pelvis made worse by a walk, sweeping, or driving the car. There may be headaches and obscure pains of a rheumatoid nature in her muscles and joints. All symptoms are usually worse at the menstrual period and acute exacerbations are prone to occur during the recession of the flow. In contradistinction to tubal infections due to the gonococcus, which causes a self-limited acute disease and whose permanent effects, when they occur, may be termed an affection rather than a disease, salpingitis due to the streptococcus is a true disease, causing prolonged illness and incapacity and exerting pernicious effects upon the entire organism. Remote effects are common. Mucous colitis is probably dependent upon a focus of infection in the tubes more frequently than upon any other single factor. Friedenwald stated that 84 per cent of his cases occurred in women and of these cases 71 per cent occurred between the ages of twenty and fifty. In 15 per cent of this number, he was able to discover some disease in the pelvis and frequently the intestinal affection became aggravated with exacerbation of the pelvic disorder. Bastedo stated that pelvic infections often render all medical treatment of mucous colitis futile. Cholecystitis, occurring three times as often in women as in men and showing an incidence that increases directly with the number of children borne, often constitutes one of the remote effects of salpingitis. Arthritis deformans, occurring predominantly in women, is no doubt frequently dependent upon a persistent tubal infection.

I recall the case of a woman who was a school teacher and who had been unable to teach school for three years, as she was incapacitated by a recurrent synovitis of her knee joints. She also suffered from discomfort and stiffness of her fingers. Six months after the removal of her tubes and uterus she was able to resume her work and her synovitis had entirely disappeared. She has had no recurrence, although it has been two years since her operation was performed.

Chronic salpingitis due to the streptococcus is a disease persistent in its course and evil in its effects. The streptococcus has been isolated from the tube nineteen years after the original attack.

Tuberculous salpingitis presents no signs nor symptoms by which it may be positively distinguished before operation from a chronic salpingitis, due to a puerperal infection, except the finding of the tubercle bacillus in the discharge. As pointed out by Greenberg, the diagnosis is very seldom made before operation, as tuberculous salpingitis is generally considered rare, in spite of the excellent articles by Hegar and by Greenberg, calling attention to its relative frequency. Greenberg found that tuberculosis of the tubes occurred in approximately 1 per cent of all women admitted to the gyne-

cological service of Johns Hopkins Hospital, and in 7.7 per cent of all abnormal tubes removed at operation. A history of tuberculosis in some member of the family was found in 25 per cent of the cases and one-fourth were found to have an associated tuberculosis of the lungs. Chronic salpingitis occurring in a patient who is sterile, who gives no history of an acute onset and who has infrequent acute exacerbations, should make one consider the possibility of a tuberculous condition. Frequently, however, tuberculous infection occurs in tubes previously damaged by the gonococcus or by puerperal infection. The typical tuberculous infection of the tubes is that one which occurs in a woman who has been sterile and who appears somewhat anemic and undernourished; or if she has given birth to a child, and the puerperium has been normal, the patient does not regain her health promptly, and gradually the pelvic condition becomes the chief complaint. Exacerbations of the pelvic condition with fever, but with a comparatively low leucocyte count, suggest a tuberculous salpingitis. A co-existing tuberculosis of the lungs, when found, helps to lead to the correct diagnosis. Ascites accompanying the pelvic condition makes the diagnosis an easy one. The three most common complaints of patients suffering from tuberculous salpingitis are pain, some disturbance of the menstrual function, and tumor, in the order of frequency.

In discussing the treatment of chronic salpingitis one enters the battle ground of gynecology. It is now generally granted that the acute stage should be treated with palliative measures with absolute rest in bed and an ice cap over the pelvis. A long douche given twice a day at a temperature as high as can be comfortably tolerated by the patient, affords considerable relief from the pain and in my experience does not retard the recovery of the patient. Frequently some drug must be given for relief of pain. The bowels must be moved by an enema given without force and very carefully, as purgation frequently provokes a fresh outbreak. In many cases where rectal examination shows extreme tenderness it is preferable to neglect the bowels for two or three days in order to allow adhesions to form. Fluids should be given freely.

Arbitrarily, it is considered that if a patient who has been free from fever for ten days to two weeks continues to suffer from pelvic pain upon examination or upon exercise, her tubal condition has become chronic. Chronic gonococcal salpingitis is a rare condition, and as such, gonococcal infections may be disregarded. In those instances in which there are frequent acute exacerbations attributable to the gonococcus, the condition in the tubes will clear up if the infection in the cervix and in Skene's ducts and the vulvo-vaginal gland is destroyed and the patient is kept from sources of new infection.

Those cases becoming chronic are predominantly streptococcal and should be regarded not only as a disease of the tubes but also as a focus of infection, a rendezvous from which the enemy wages a constant warfare against the body. Here he lies in wait, safely entrenched, holding a vigilant siege, and at the first evidence of a withdrawal of the defensive forces or of a lowering of resistance sending out a skirmishing party to do damage wherever entrance can be made, here attacking a knee and injuring the transportation lines, there a colon and seriously damaging the sanitary department, and in another instance the gall-bladder and interfering with the commissary department. By such measures the defense of the organism is weakened and finally the citadel of health is thoroughly destroyed by a general sally of the enemy. Conservatism has no place in the treatment of such an enemy. The removal of both tubes with excision of the isthmus is indicated. Complete eradication of this focus of infection is indicated even as the eradication of a focus of infection in a peridental abscess is indicated. The health of the body as a whole is menaced and temporizing measures cannot be employed safely. In most instances both ovaries may be conserved. It is extremely rare that it is necessary to remove both, and everything possible with safety to the patient must be done to conserve the ovaries. In those patients who have had a marked disturbance of the menstrual function, or who have had a previous operation for a pelvic condition, there should be no hesitancy in removing the uterus. If the ovaries are not sacrificed the effect on the patient is not bad. If it is explained to these patients that their ovaries have not been removed and that their sexual function has been preserved, neither their appetite for nor gratification at the sexual act will be decreased. In many instances the patient's husband has reported a marked improvement in that respect. The effect of the cessation of the menses on a woman whose ovaries have been conserved has been exaggerated. This effect cannot be com-

pared to the effect produced by removal of the ovaries with the production of an abrupt menopause in a young woman.

Tuberculous salpingitis demands removal of the tubes and very frequently of the ovaries also. There is no difference of opinion in this matter. Extreme care should be used in operation, as the infiltration of the surrounding tissues renders them very friable and the bowel is frequently injured. Operations for tuberculous salpingitis result in more fecal fistulae than any other intra-abdominal operation with the sole exception of gangrenous appendicitis. The fistulae resulting from operation for tuberculous salpingitis stand first in their persistency. Drainage should be avoided if possible, as fistulae often develop after drainage even when the operator was not aware of any injury to the bowel.

SUMMARY

(1) Bacteriological examination of smears taken from the cervical discharge should be made a routine procedure in all cases of acute salpingitis.

(2) Gonococcal salpingitis is an acute self-limited disease. It may leave damaged and occluded tubes susceptible to restoration at operation, but does not become an active chronic disease.

(3) Streptococcic salpingitis is a true disease, becoming chronic and menacing the general health of the patient.

(4) In treating chronic salpingitis, a cure is obtained only by complete removal of the diseased tube.

DISCUSSION (*Abstract*)

Dr. T. B. Sellers, New Orleans, La.—I cannot stress too strongly the importance of making a differential diagnosis between the various types of salpingitis. In this, a complete and intelligent history from the patient is of paramount importance.

Gonorrheal salpingitis should be classified and handled as a strictly medical condition, and it is unfortunate for the ultimate good of these patients that, insofar as mortality is concerned, they tolerate radical surgical measures surprisingly well.

Postabortal or post partum salpingitis in the acute and subacute stages tolerates surgery very badly. The mortality is in almost direct ratio to the length and type of the rest period preceding surgical measures.

I agree with Dr. Turner that chronic streptococcal and staphylococcal salpingitis is a potential focus of infection.

I have diagnosed comparatively few cases of tuberculous salpingitis in my practice. No doubt many of these cases are overlooked on account of the existence of a superimposed secondary infection.

I should apologize to this audience for again reviewing the strict meaning of the words "rest treatment," but the repetition seems justifiable when we realize that the difference between a successful and an unsuccessful medical regime lies in the observation of all the points enumerated here. The patient should be instructed as follows:

(1) The condition is serious and requires the full cooperation of the patient.

(2) It is absolutely necessary to go to bed and not get up for anything, using a bed-pan and having some one assist in the giving of meals. (The patient may be permitted to turn on the side and rest on the elbow while eating.)

(3) Food and fluids should be forced and tonics given when indicated. (Bitter tonic for lack of appetite and iron for anemia.)

(4) The bowels must be kept open with a mild laxative.

(5) Use an ice bag continuously.

(6) Take a hot douche very slowly, at least two gallons, twice a day, with the douche can not more than eighteen inches above the hips and with some one adding hot water continuously to keep it as hot as the patient can tolerate it. Remember that the douche is given for the therapeutic effect of the heat and not for cleansing purposes.

The physician must visit these patients at least two or three times a week and, if there is a seeming lack of cooperation on the part of the patient, he should go oftener. The treatment should continue until the temperature is normal for several days and there is no elevation following a gynecological examination with manipulation. They then become ambulatory or surgical patients.

The sedimentation test is almost indispensable as an aid in determining when the patient is ready for operative interference, as the sedimentation time should always be over one hour before surgery is considered.

Dr. John C. Burch, Nashville, Tenn.—Gonorrheal salpingitis is one of the major problems confronting our specialty. We have had a rather extensive experience with the disease in the Vanderbilt University Clinic.

The fundamental principle of the treatment of the disease should be based on the fact that salpingitis is a self-limited manifestation of a chronic gonorrheal cervicitis. The rational treatment of the disease then depends upon eradicating the cervical infection. We practise bisection of the cervix with extensive cauterization of the endocervix and suture of the incisions after the cauterization. The postoperative treatment is a little protracted, but we always get negative smears before discharging the patient.

A frank discussion with the patient is most helpful in eliminating the problem of reinfection. Our results according to the above plan have been exceedingly satisfactory. In the past five years we have not found it necessary to operate for the removal of gonorrheal pus tubes.

Dr. G. E. Johnson, Ardmore, Okla.—I should like to ask the essayist about his experience with vaccines and serums. Aside from the psychic effect I have not seen any very good results from them.

Many surgeons are too eager to operate upon these cases. I think we should put the patients to bed in a Murphy position with an ice-pack over the ovaries and tubes. We should give hot antiseptic douches and enough viburnum and papine to make the patients comfortable and allow time for the infection to subside. Above all things, never use radium in specific inflammatory conditions.

In this manner, many abscess formations can be prevented, and if surgical interference becomes absolutely necessary the chance for recovery is very much improved and the time in the hospital will be very much less.

Dr. Turner (closing).—I believe the pendulum has swung too far in regard to conservative treatment of these cases. I try to cure salpingitis with conservative measures and believe that more treatment should be accorded the lower part of the genital tract in attempting to prevent re-infection of the tubes from a focus in the cervix or vulvo-vaginal glands. There are two or three things that hurry us into operating: the economic condition of the patient, the patient's impatience, and the lack of proper cooperation on the part of those patients who can well afford the necessary rest in bed Many women who come into the charity hospitals are eager to get out and their families cannot spare them. Frequently they are wage earners. Many patients come in who have passed through a period of prolonged treatment and who have been invalids for years. Many patients, after an operation, come back with what we call nodosal salpingitis, which frequently necessitates a second operation.

I believe it is the general rule in vaccine therapy that all infection cannot be cleared up, either in the nose or the uterus, by vaccines. The organisms may be attenuated and the resistance of the patient somewhat improved, but this treatment cannot cure. The organisms persist and at a favorable time an acute exacerbation occurs.

DERMATITIS EXFOLIATIVA ARSENICALIS: REPORT OF CASES OF PERIVENAL EXTRAVASATION*

By C. F. LEHMANN, M.D.,
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In 1922, Klauder[1] reported the case of a physician who developed asthma and a dermatitis of the hands when he prepared arsphenamine for injection. In this report he mentioned the possibility that perivenal extravasation might sensitize a patient to the drug.

OLDER THEORIES OF CAUSE OF THE DERMATITIS

Previous to this there were numerous theories regarding the cause of arsenical exfoliative dermatitis: Stokes[2] has called attention to the frequent association between foci of infection and the condition, and intimates that there is a strong suggestion that a predisposition is caused by such toxins. Another predisposing condition mentioned by him is the seborrheic skin. Others have thought that liver damage by the drug is an important factor. The rationale of this idea was that the liver stores arsenic, and as part of its detoxicating function releases it in a less toxic state than that in which it is received. When the liver is deranged this function is lost and the drug is flooded into the areas where most damage is done, namely: the skin and bone marrow. Stokes has pointed to the fact that liver damage in the course of arsphenamine injections may not be due to the drug, but to intercurrent infection. Milian[3] has attributed the dermatitis to a hepatitis which he terms a "hepato-recidive."

The profound changes in the blood stream and bone marrow in dermatitis exfoliativa, as emphasized by Betances,[4] can not be passed over lightly as having no etiological significance.

Overloading the patient with arsphenamines or combined therapy have been mentioned as a cause of exfoliative dermatitis, but this idea does not explain all cases. It does not explain why a patient may have the explosion of exfoliative dermatitis on a plan of therapy that uses relatively small doses; nor does it explain why no greater number of patients who receive combined therapy develop the condition than those who receive arsenicals alone.

After a consideration of the various theories one cannot help but agree with Stokes that the condition is caused by a "complex of interacting factors."

ARSPHENAMINE SENSITIZATION AN ANAPHYLACTIC STATE?

There has been strong objection raised against the idea of considering a drug toxicoderma, such as arsenical exfoliative dermatitis, as a manifestation of allergy. Kyrle[5] particularly objected on the grounds that any conception of allergy embraced a protein substance as the activating agent. However, it could be possible that a combination of arsenic and a body protein were formed which would act as the atopen, and thus would satisfy this tenet (as suggested by Stokes).

The clinical observation that a patient who once has had an exfoliative dermatitis can not tolerate the slightest amount of the drug substantiates the idea that the intolerance is certainly akin to an allergic state.

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*Read in Section on Dermatology and Syphilology, Southern Medical Association, Twenty-Fourth Annual Meeting, Louisville, Kentucky, November 11-14, 1930.

Recently laboratory experimentation has confirmed this theory. Frei[6] demonstrated that intracardial injections prevented the development of the sensitive state in guinea pigs who had received previously intracutaneous applications of the drug. Sulzberger[7] corroborated this work, and further found that the development of the sensitive state was not prevented if the intracardial injections were administered after a two-week period from the time of the skin applications.

In man there have been a few experiments on arsphenamine sensitization. Passive transference of the sensitive state against arsphenamine has been accomplished once by the Koenigstein-Urbach method* (by Fuhs and Riehl).[8] Transference of the sensitive state by use of the Prausnitz-Kuestner method† has not been successful. Because of this and from his experiments Schoch[9] suggests that most probably the antibodies concerned in these sensitized individuals are formed in the skin and not in the blood stream.

Sulzberger cites the following facts which were previously advanced by Jadassohn and later by Stauffer, concerning the skin reactions in sensitive states:

(1) "Patients suffering from allergic urticarias which are traceable to a certain specific agent generally give, to an application of this substance on a scratch test, an immediate reaction in the form of an urtica. If a solution of the substance is applied intradermally, a rapidly growing wheal also ensues. This form of immediate urticarial reaction need not be present in cases of allergic eczemas or non-urticarial toxicodermas; (2) the urticarial type of hypersensitivity can often be passively transmitted with the serum of the patients by the method of Prausnitz and Kuestner, while in eczematous and in other types of allergic skin manifestations (that do not show the immediate wheal reaction described) this is not possible, as a rule."

EXTRAVASATIONS IN MY CASES

Since Klauder's report I have tried to determine whether or not there had been a previous perivenal extravasation in every case of arsenical exfoliative dermatitis of which I heard, or which I saw. I have been surprised to see the high incidence.

During the past eight years 22 cases have been collected, and in 17 of them there is a history of a perivenal extravasation before the onset of the dermatitis (77 per cent).

It was possible to determine the time interval between the extravasation and the onset of the dermatitis in only 15 of the 17 cases. This varied from four days to three weeks, as follows: under one week, 4 cases; seven to fourteen days, 7 cases; over fourteen days, 4 cases. There was no relation between the number of injections and the development of the dermatitis. The drug used was neo-arsphenamine, in 19 cases; sulpharsphenamine in 3 cases. Two of them received sulpharsphenamine intravenously.

CONCLUSIONS

(1) Theories regarding the causation of the exfoliative dermatitis from arsphenamine are recapitulated.

(2) The experimental and clinical observations pertaining to the development of the sensitization state are reviewed.

(3) Seventeen out of 22 cases of exfoliative dermatitis occurring during arsphenamine therapy, who received a perivenal extravasation previous to the onset of the dermatitis, are reported.

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DISCUSSION (*Abstract*)

Dr. Harry M. Robinson, Baltimore, Md.—I believe that I have given as many arsphenamine injections as anyone in this country. In the last eighteen years my assistants and I have given over 200,000 injections of arsphenamines. I think it is almost impossible to give an injection without depositing a drop or two of the drug in the skin or subcutaneous tissue. In addition students and assistants have frequently given actual extravasations into the tissues, causing severe inflammatory lesions; and in spite of this I have seen only about 85-90 cases of arsphenamine dermatitis. On the other hand, in cases of dermatitis, there is a history of only 4 or 5 in whom there has been actual extravasation of arsphenamine into the tissues. Of the numerous other cases of extravasation there has never been noted any dermatitis. It is our opinion that in allergy or hypersensitization, or whatever you wish to call it, lies the principal factor, and contributing factors are negligible.

*Konigstein-Urbach method is the application of arsphenamine on a sensitized patient's skin and collection of the fluid from the vesicle raised by this application. This fluid is injected intradermally into the passive individual, and later the injected site is tested with a surface application of the drug.

†In the Prausnitz-Kuestner method the sensitized person's blood serum, instead of the vesicle fluid, is injected intradermally into the passive individual.

Dr. Lehmann (closing).—Sulzberger, if I may quote him again, suggests in his article that should an extravasation occur, one should go right ahead and inject the drug intravenously as soon thereafter as possible. He drew this deduction because after waiting after the two-week period in his animal experiments intracardial injections did not prevent the development of the sensitive state. Now, I admit with Dr. Robinson that practically every injection gets some of the drug into the skin; and I wonder if the explanation of why we do not see more of these cases is simply that we go ahead and put the medicine into the blood stream immediately. If Sulzberger's explanation is correct, that might explain why we do not have more cases. It is simply because it is put into the blood stream, and we do cause the development of bodies that would prevent the sensitization.

I was struck by the high incidence of perivenal extravasation in my cases. In statistics, previous perivenal extravasation is not mentioned, and I wonder if, in the future, we inquired on this point, we might find the incidence of perivenal extravasations much higher; and that the exfoliative dermatitis cases were the ones that did not receive their intravenous medicine when an extravasation occurred.

THE PUBLIC HEALTH ASPECT OF SYPHILIS IN THE NEGRO RACE IN CERTAIN SOUTHERN STATES*

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and
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The object in presenting this paper before the Public Health Section of the Southern Medical Association at this time is fourfold:

(1) To demonstrate that syphilis in the negro race is a major public health problem of certain of our Southern counties;

(2) That it is possible to uncover, by a Wassermann survey, all cases of syphilis showing a positive serology, which is the most important group from a public health standpoint;

(3) That the mass control of these cases, by organized treatment, is not only possible but practicable in the rural communities; and

(4) That this plan of control of syphilis is a legitimate function of the county health unit and may be readily incorporated into the usual program.

*Read in Section on Public Health, Southern Medical Association, Twenty-Fourth Annual Meeting, Louisville, Kentucky, November 11-14, 1930.

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‡Epidemiologist, Mississippi State Board of Health.

I. COOPERATING AGENCIES

The Julius Rosenwald Fund; the State Health Officers of Mississippi, Alabama, Georgia, North Carolina and Tennessee; the local county health units in which these demonstrations are being carried on; and the Division of Venereal Diseases of the U. S. Public Health Service are cooperating in these studies.

II. SELECTION OF COUNTY

(1) The state health officer selected the county.

(2) The county selected had a full-time county health unit, willing to cooperate.

(3) The county had a negro population sufficiently large to assure a reasonably good cross section of this group.

(4) The plan was endorsed by the local medical society in each county.

(5) The state board of health or some other organization assumed responsibility for half of the budget.

(6) The Julius Rosenwald Fund assumed responsibility for the other half of the budget.

III. PROCEDURE

(1) *Organization of Staff.*—A staff consisting of a clinician and one or more nurses, depending upon the scope of the program, was organized. In one instance, a clerk was added to the staff.

(2) *Preliminaries.*—The plan was outlined before the different county medical societies and personally with the individual members when possible. The county officials were then approached and later the land owners and influential residents, both white and colored, were interviewed. The negro population was addressed in public meetings, after church services and in the schools. Negro teachers and ministers were appointed leaders to explain the program to their own group. Handbills were distributed in the rural sections, showing time and place where the preliminary Wassermanns would be taken. The county superintendent of schools made the necessary arrangements so that the children could be reached.

(3) *Collection of Specimens.*—The specimens were collected from the assembled groups in churches, school houses and country stores. The first 5,000 specimens were taken with Luer syringes, but this proved unsatisfactory and quite expensive. The remaining 25,000 specimens were collected by the Keidel tube method, which is in every way superior. Each specimen taken was marked with a serial number and the

patient's initials. All specimens collected were forwarded to the state board of health laboratory for examination. Each state was permitted to use its own particular method of Wassermann technic because it was felt inadvisable to make any changes or insist upon any one particular method of examination.

Only positive reports were considered, 1, 2, 3 and 4 plus cases being alike considered positive. The positive cases were then informed by mail, through a form letter, that their blood was "bad" and they were requested to report on a certain day and hour for a second Wassermann and physical examination. All age groups and both sexes of unselected groups were studied in all five demonstrations.

(4) *Physical Examination.*—Physical examinations were made in the field at churches or school houses. Examination included heart, lungs, skin, reflexes, teeth, throat, blood pressure, weight and urine analysis. All findings were made a matter of record, using a standard form of history sheet. A second Wassermann was taken for recheck.

IV. ORGANIZATION OF CLINICS

In three of the five demonstrations a central clinic was organized in the county seat, either in the building occupied by the county health unit or in an adjacent building. Field clinics were organized at strategic points throughout the county that the patients might receive their treatment more conveniently and with less loss of time from work.

V. TREATMENT

A course of treatment for one year was outlined, which consisted of three courses each of eight doses of neo-arsphenamine, starting with 0.2 grams as the initial dose and gradually working up to 0.6 grams, giving one dose per week. Each patient was to receive approximately 24 doses of neo and 200 mercury inunctions for the year's treatment.

Mercury was administered by the inunction method. A course consisting of 65 inunctions was given. Each inunction contained 15 grains of metallic mercury and the patient received 6 doses per week. The mercury was massaged into the skin of the abdomen and back of the patient by the use of a specially devised belt. Rest periods were permitted between each course of treatment. Urine analysis was checked once per month. Wassermann checks were made after each rest period. Only cases showing a second positive Wassermann, which served as a check on the first, are considered in this study.

VI. RESULTS OF WASSERMANN SURVEY

(1) *Mississippi.*—There were five counties studied in Mississippi, with a total negro population of 109,324. The Wassermann survey covered 9 per cent of this group. All of the counties studied are classified as agricultural, with cotton as the principal product.

The total number of Wassermanns taken was		9,753
Negative	7,797	
Positive	1,956	9,753

The ratio of positive Wassermanns was 20 per cent

(2) *Alabama.*—The survey in Alabama was limited to approximately one-fourth of the area of the entire county. This is considered an agricultural community, with cotton as the principal product. The colored population of the entire county is 20,000. The Wassermann survey covered 18 per cent of the total population.

The total number of Wassermanns taken was		3,684
Negative	2,210	
Positive	1,474	3,684

The ratio of positive Wassermanns was 35 per cent

(3) *Georgia.*—The survey in Georgia was limited to one entire county, which is an industrial community, with practically no agricultural population. The total negro population of the county is 8,000 and the Wassermann survey covered 72 per cent of the entire negro population.

The total number of Wassermanns taken was		5,775
Negative	4,237	
Positive	1,538	5,775

The ratio of positive Wassermanns was 26 per cent

(4) *North Carolina.*—The survey in North Carolina was limited to one county where the principal agricultural product is tobacco. The total negro population of the county is 24,000. The Wassermann survey covered 42 per cent of the total negro population.

The total number of Wassermanns taken was		10,196
Negative	8,995	
Positive	1,201	10,196

The ratio of positive Wassermanns was 12 per cent

(5) *Tennessee.*—The survey in Tennessee is limited to one county, where agriculture is the principal pursuit. The work started October 1, 1930, and reports on less than one thousand Wassermanns have been received. The total negro population is given at 10,000 and 9 per cent of the total population have been reached up to date.

The total number of Wassermanns taken to date		851
Negative	634	
Positive	217	851

The ratio of positive Wassermanns is 25 per cent

VII. INTERPRETATION OF RESULTS OF WASSERMANN SURVEY

It will be noted, from the table on page 5, that in a total of 30,090 serological examinations in a group of unselected negroes of all ages and in both sexes, some 6,149, or 20 per cent of the total, showed a positive serological reaction. The highest per cent of positives was in the Alabama group, on the basis of 3,515 examinations, where the rate was 35 per cent for the positives. Georgia came next with a positive rate of 26 per cent on the basis of 5,775 reports. Mississippi was third, with a positive rate of 20 per cent in 9,753 examinations. In North Carolina, on the basis of 10,196 examinations, only 12 per cent were reported as positive. The Tennessee group will not be considered further because the work has just started.

One's attention is immediately directed to the great differences in the positive percentages. Why should a county in Alabama show 35 per cent positive and another county in North Carolina only 12 per cent? At this time we cannot offer any convincing evidence as to why this should be. What evidence is available is so conflicting in character that no definite conclusions can be drawn.

All cases in the age groups 0-14 years are considered heredo-syphilis; above that, acquired syphilis. The highest rates are in the age group 25-29, with 32 per cent as the peak for the male, and the age group 20-24, with 34 per cent as the peak for the female. After the fortieth year the general trend is downwards, since the Wassermann after a time becomes negative, with or without treatment, and cardiovascular syphilis begins to develop. The female rate is higher probably because there are few labial chancres; most chancres are on the cervix and the female is unaware of her infection. The male will be more likely to know of his infection because of the penile lesion, and to seek treatment.

VIII. RESULTS OF THE TREATMENT

(1) *Mississippi.*—In this group of 30,090 Wassermanns, 6,149 positive cases were uncovered. Of the 6,149 positives, 1,956 were found in five different counties in Mississippi. Of this number, 1,350 cases were turned over to private physicians or local health officers for treatment. Six hundred six cases were treated in the Mississippi demonstration project.

Of the 1,350 cases uncovered, 406 positive cases were uncovered in one county, of which 20 per cent took treatment from the local health officer. Others were treated by private physicians, but there are no records available as to how much treatment these cases received.

Of the 606 cases treated at the Scott demonstration from October 1, 1929, to October 1, 1930, with neo and mercury, the records show that 5,774 doses of neo and 34,424 doses of mercury were administered. This gives an average for each patient of 10 doses of neo and 57 doses of mercury. Comparing the amount of treatment which the average patient received in this demonstration with what he would be able to pay for or actually receive from a private physician, we feel this is an exceptionally good record.

A Wassermann re-survey is now being undertaken to determine what serological changes have taken place in the cases treated. Up to date 100 patients have been rechecked and the records show that 72 per cent of the cases who started with a positive reaction are now negative. There were 12 deaths during the year in this group. In these 12 deaths, 4 occurred from causes remote from syphilis or the treatment. In 7 cases, death was caused by cardiovascular syphilis and in one case only treatment may have been a contributing factor in the death.

(2) *Alabama.*—In the Alabama demonstration there were 3,684 Wassermanns taken, of which 1,474 were positive. There were 79 patients who did not report for the physical examination and 121 patients who did not report for treatment after the examination was completed.

This demonstration has made an exceptionally good showing. Some 447 patients, or 47 per cent, received the maximum amount of treatment of 12 doses of neo, and 46 per cent received an average of 10 doses. The remaining 7 per cent received an average of 5 doses. There were 4 deaths, but in only one case treatment may have been a contributing factor. Wassermann rechecks are now being made.

(3) *Georgia.*—In the Georgia county demonstration there were 5,695 Wassermanns taken, of which 1,498 were reported as positive. There were 362 patients who did not return for the physical examination and 67 cases did not return for treatment after the physical examination had been completed and the history taken. Of the 1,069 patients who started the course of treatment, 775 were treated with neo and mercury and 294 patients received some other form of treatment for syphilis.

Up to date these patients have received an average of 8 doses of neo and 48 doses of mercury and the demonstration has been under way approximately five months. There were five deaths occurring in this group under treatment. In four of these deaths treatment was not a factor. In one death arsenic therapy may have

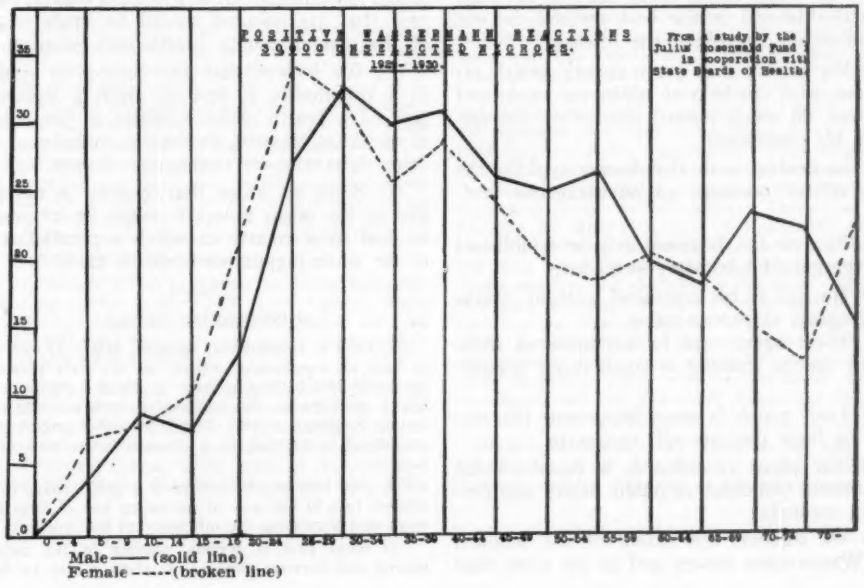
been a factor. Wassermann recheck reports are not available at this time.

(4) *North Carolina.*—In the North Carolina county there were 10,196 Wassermanns taken, of which 1,201 were positive. Ninety of these cases did not report for examination and 34 others did not return for any treatment after the examination had been completed. Treatment was started on 1,079 cases, of which 837 received arsenic and mercury and 242 received

TABULATION OF WASSERMANN SURVEYS OF COLORED POPULATIONS IN MISSISSIPPI, ALABAMA, GEORGIA, NORTH CAROLINA, TENNESSEE ON 30,090 SEROLOGICAL EXAMINATIONS

From a Study by the Julius Rosenwald Fund in Cooperation With State Boards of Health

	MALE				FEMALE				GRAND TOTAL			
Age	Neg.	Pos.	Total	% Pos.	Neg.	Pos.	Total	% Pos.	Neg.	Pos.	Total	% Pos.
0-4	300	14	314	4%	234	18	252	7%	534	32	566	6%
5-9	1,625	157	1,782	9%	1,676	158	1,834	8%	3,301	315	3,616	9%
10-14	2,087	177	2,264	8%	2,170	248	2,418	10%	4,257	425	4,682	9%
15-19	1,818	271	2,089	13%	1,957	510	2,467	21%	3,775	781	4,556	17%
20-24	1,321	499	1,820	27%	1,218	651	1,869	34%	2,539	1,150	3,689	31%
25-29	861	411	1,272	32%	948	451	1,399	32%	1,809	862	2,671	32%
30-34	663	279	942	29%	816	303	1,119	26%	1,479	582	2,061	28%
35-39	663	290	953	30%	704	293	997	29%	1,367	583	1,950	30%
40-44	541	196	737	26%	651	214	865	25%	1,192	410	1,602	26%
45-49	623	212	835	25%	545	138	683	20%	1,168	350	1,518	23%
50-54	587	211	798	26%	467	104	571	18%	1,054	315	1,369	23%
55-59	394	89	483	19%	201	51	252	20%	595	140	735	19%
60-64	229	51	280	18%	162	40	202	19%	391	91	482	19%
65-69	129	40	169	23%	88	16	104	15%	217	56	273	20%
70-74	91	25	116	22%	64	9	73	12%	155	34	189	18%
75-	69	12	81	15%	39	11	50	22%	108	23	131	18%
Totals	12,001	2,934	14,935	19%	11,940	3,215	15,155	21%	23,941	6,149	30,090	20%



other treatment for syphilis. Up to date these patients have received an average of 7 doses of neo and 36 doses of mercury, after four months of treatment.

Two deaths were reported in this group, but since neither of these cases received any treatment at the clinics and death was due to other causes, they will not be discussed.

(5) *Tennessee.*—The work in Tennessee was just started October 1, and it is too early to have any data on this project.

IX. SUMMARY

(1) The object of this paper is explained.

(2) The method of procedure is outlined.

(3) Results of Wassermann surveys are shown.

(4) Results of treatment are reported.

X. CONCLUSIONS

(1) The data presented show that in from 12 per cent to 35 per cent of a selected group of the negro population in several different counties and 5 different states in the South syphilis is a major problem in public health. The end results of syphilis as an economic problem are too well known to require further discussion.

(2) The Wassermann survey, as outlined in this paper, is practicable and can be accomplished with the usual type of personnel found in county health units in the Southern states.

(3) The treatment of these cases in the field is practicable and is the best method, in our experience, of controlling the disease.

(4) We believe that every county health officer can, with the help of additional funds and personnel, do much toward controlling the disease in his community.

(5) In dealing with the disease syphilis the health officer occupies an advantageous position:

(a) Because the diagnosis may be established on a recognized laboratory procedure.

(b) He has at his command certain therapeutic agents of proven value.

(c) These agents can be administered without any special training or cumbersome apparatus.

(d) Last, which is most important, the majority of these patients will cooperate.

(6) The plan, as outlined, is based on the fundamental principles of public health and preventive medicine.

(a) We discover the extent of the problem by a Wassermann survey and at the same time uncover the "carrier," if such a term may be used, or the so-called infectious group.

(b) By treating these cases we render the infectious cases non-infectious, which prevents some new cases in the community, lowers the infant death rate and at the same time arrests the progress of the disease so that many of the patients may not, at a later date, become a burden on the community or state.

(c) The statistical data collected in such studies are of great importance and the clinics offer an opportunity for the training of medical practitioners in the community.

(d) The incidence of syphilis as shown by these surveys is certainly greater than small pox, typhoid, diphtheria and many other diseases, the control of which comprises a large part of the health officer's duties. Since the general practitioner is not concerned particularly with the problems of preventive medicine on a large scale, as the health officer is, we can hardly expect any decrease in the incidence of syphilis if the matter is left in the hands of the private physician alone.

Whatever progress has been made in the mass control of such diseases as smallpox, typhoid, diphtheria, malaria, pellagra, and so forth, has been done by the health units in the community. We believe the application of the same principles must be followed if we are to control syphilis. We must have the support of the local medical profession as we have in all public health movements, but any syphilis control measures that are adopted should be made a part of the regular county health unit program.

(e) We believe that the control of syphilis in a community is just as much a legitimate part of a health officer's duties as the control of smallpox, typhoid, diphtheria, malaria, or any other infectious or contagious disease.

(f) Since we know that syphilis is not limited to the negro group, it might be interesting to find some county in which a parallel study of the white population could be made.

DISCUSSION (*Abstract*)

Dr. Felix J. Underwood, Jackson, Miss.—If one were to base his conclusions entirely on the data presented, he would believe that syphilis is indeed a major public health problem in the negroes of certain counties of certain Southern states. There are other angles to be considered in arriving at a decision for a plan of attack:

(1) Just how much damage is syphilis doing to the colored race in the way of increasing loss of time from work and decreasing the efficiency of the worker?

(2) What part is syphilis playing in the field of mental and nervous disease? Is there a way to deter-

mine accurately the chance of a syphilitic's becoming insane and the chance of his becoming insane as a result of heredity?

I do not believe sufficient information is presented by the essayist to draw the conclusion that mass treatment is practicable. None of these treatment experiments are completed and very limited study has been made of the results obtained up to the present time.

Riley, of the U. S. Public Health Service, by questionnaire method, obtained from physicians information which he deemed to be satisfactory insofar as percentage replying was concerned. His survey in certain Southern states in rural counties showed 0.6 per cent of the colored population under treatment. The lowest percentage positive of a group, shown by the Wassermann surveys done, is 12 per cent. What is the explanation for the great difference between the percentage of those having syphilis and the percentage of those under treatment for syphilis? One of two things is true: either syphilis is not causing the negro of the South much discomfort, or the medical practitioners of the respective states are not diagnosing 95 per cent of the syphilis in North Carolina, 97 per cent in Mississippi, 97.7 per cent in Georgia, and 98.3 per cent in Alabama.

The treatment experiments under way do show that mass treatment is practical insofar as treatment is concerned. It remains for further study to prove whether this method of approach to the problem is the practical or economical one.

Dr. A. T. McCormack, Louisville, Ky.—If the fact that fully 95 per cent of syphilis in our respective states is not even suspected could be impressed on the profession, syphilis would be cleared from our land. People need to know the truth about themselves and the causes of their ailments. One of the special activities of the public health service used to be to send qualified men before the county societies to emphasize the importance of complete examination of patients and their families.

The intelligent public is apt to demand a treatment that means state medicine, because of the effective work done in certain medical and health organizations. We want to avoid state medicine. We are opposed to it, as public health specialists in medicine. We can measure up to our responsibility in one way only, and that is to get every member of our profession to realize his responsibility and qualify himself to treat every poor deserving individual and family suffering from these ills just as effectively as he treats the rest of his patients. Unless that is done, we face a demand that will only be handled by effective public health practice reaching into every home.

If Dr. Wenger wishes to make a survey in Kentucky, we will put up the required half of the expense. There are forty-five counties with full-time health units, all of which will want him, and every health officer will be ready to get behind him.

Dr. Jethra Hancock, Louisville, Ky.—About three years ago the Public Health Service undertook a nation-wide survey by taking a given number of representative communities and ascertaining the number of cases of venereal diseases in the hands of the physicians in these selected communities on a given date. This gave us a fairly accurate basis for an accurate estimation of the incidence of venereal diseases in the whole population of the country. Knowing as we do that the incidence of syphilis is much higher in the colored population, this survey gives us additional accurate information on which to base our conclusions when dealing with the colored race.

It has certainly been depressing in the last ten years to see many conflicting opinions as to the prevalence of syphilis in the general population. Some estimations were so erroneous as to make any statements appear ridiculous; others tended to minimize the whole subject, thus leaving the lay officials whom we sought to impress in a maze of confusion. We should all feel a deep sense of obligation to the Public Health Service and Dr. Wenger for this survey.

Dr. F. Michael Smith, Vicksburg, Miss.—Inasmuch as Dr. Wenger reports a series of cases with a Wassermann report from the laboratory, I am curious to know whether on these same cases an agglutination test was made. Were the Kline and Young tests, as well as the Kahn made? If so, what per cent of those showing a positive Wassermann showed also a positive Kline and Young, or Kahn? And if these tests are more sensitive than the Wassermann, as we have been taught, would he consider antiluetic treatment just as imperative in a case with a 2 plus or more Kline and Young or Kahn in the absence of a negative Wassermann as if there had been a positive 1 plus or 2 plus Wassermann? In other words, with the absence of a positive Wassermann reaction and the presence of a 1, 2 or 3 plus Kline and Young, would specific treatment be just as imperative?

Another factor in the problem of controlling the incidence of syphilis in the negroes of the South is the qualification and character of the physician who proposes to treat these diseases. In our city I recently had occasion to prosecute a physician practising without a license, and as we might expect, his specialty was venereal diseases. Just before leaving home for this convention I made another affidavit against this same man, who was continuing to treat syphilitics and all venereal diseases that came to him. Just a few days previous to this a patient was brought to my attention, by a colored physician of our city, who had been under the treatment of a faith healer, Elder B., and this patient showed a 3 plus Wassermann. Many people, some of them intelligent, with these loathsome diseases seem to think that they get adequate treatment from quack doctors, charlatans, or faith healers. There is an urgent necessity for more high type, well educated, conscientious and efficient physicians in our Southland who will make a detailed and intensive study of the venereal disease problem and specialize in this work. Physicians who have specialized in other fields of medicine should refer cases of venereal diseases to these specialists. Our health departments, the medical profession, and social organizations should exert efforts to educate and impress the general public with the formidable nature of the diseases and the inestimable importance of seeking treatment from qualified men.

Dr. Wenger (closing).—Of course, no one takes 2 plus Wassermann alone as a definite sign of syphilis. I purposely avoided discussion of laboratory tests.

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FAILURES OF TONSILLECTOMY

Those skilled surgeons, the ancient Hindus, one thousand years before Christ, advocated the removal of tonsils by seizing them with forceps and cutting them with a semicircular knife. The extreme popularity of tonsillectomy, however, dates within the last twenty years, when the rate has accelerated to the point where one-third of all operations performed among the American urban population have been for the removal of tonsils and adenoids.[1]

Several series of thousands of tonsillectomies have now been reported and analyzed to determine the precise effects of the operation upon the patient. In some of the series, the incidence of several infectious diseases has been reported slightly lowered following tonsillectomy. In most of the series, beneficial effects of tonsillectomy upon certain averages of disease incidence are reported.[2] The various authors, however, do not agree as to the diseases prevented or as to benefits obtained.

Cunningham[3] has recently reviewed the vast literature and added another series which includes more than 12,000 cases from the files of women students at the University of California. Their histories were analyzed to compare the incidence of illness in those with no tonsils, in those with normal tonsils, and in those with pathological tonsils. The groups with normal and with pathological tonsils differed insignificantly in the incidence of the following diseases: measles, mumps, chicken pox, whooping cough, scarlet fever, diphtheria, pneumonia, pleurisy, chronic colds, rheumatism, and chorea. There was also no difference in the number of appendectomies, mastoidectomies and operations upon the cervical lymph nodes and nose. Among the young women without tonsils, there was more illness than in the group with tonsils. This is not due to the operation, of course, Cunningham says, but occurs because the child who is often ill ultimately has his tonsils removed. Those who are most ill are most tonsillectomized. A review of the literature on the effect of the condition of the tonsils on the general health, she says, reveals a great lack of accurate information as to the effects of tonsillectomy, which is surprising when one considers the number of operations performed. There is a growing tendency, says the California author, to question the value of tonsillectomy as a prophylaxis against infectious diseases, or in the prevention or cure of rheumatism, chorea, and carditis.

If removal of the tonsils is not beneficial in these conditions, what is left?

No medical theory can be held sacred or unassailable. Each one must be strong enough to bear the impact of continual beating of the flood of scientific advance. Tonsillar infection has been the pillar of strength of the whole theory of focal infection, which has been called "America's greatest gift to medical science." Impeachment of the theory of the relationship of pathological tonsils to the symptoms of chronic disease would be an impeachment of the whole theory of focal infection. One would need simultaneously to deny the value of filling holes in decayed teeth, or of abstracting teeth with abscessed roots, or actually, of the fundamental principle of surgery, the release of pus. Obviously there are times when tonsillectomy is beneficial. It is equally probable that a number of needless operations have been performed.

The *Journal of the American Medical Association*, in commenting editorially[4] on the govern-

1. Collins, S.D.; and Sydenstricker, E.: An Epidemiological and Statistical Study of Tonsillitis. Pub. Health Bull., p. 175, 1927. Quoted by 3 and 4.

2. Kaiser, A. D.: Incidence of Rheumatism, Chorea and Heart Disease in Tonsillectomized Children. J.A.M.A., 89:2239, 1927. Quoted by 4.

3. Cunningham, R. S.: Normal, Absent and Pathological Tonsils in Young Women. Arch. Int. Med., 47: 513, April 1931.

4. Tonsillectomy in the United States. Ed. J.A.M.A., 91:1195, 1928.

ment report which indicated that tonsillectomy, although sometimes helpful, frequently failed to improve the condition of the patient, called attention to a report of Rhoads and Dick[5] that pieces of tonsillar tissue were left *in situ* in 73 per cent of 403 patients tonsillectomized under good conditions; and that these small tonsil tags contain more bacteria per gram than larger tonsils. If this be confirmed, all contemporary statistics will become confused and conclusions from many recent series will be questionable.

The statistics reported have dealt chiefly with well persons, in many instances with children attending school. When one considers a large number of chronically invalided individuals with and without tonsils, the results may be quite different. Fifty cases have recently been reported in the *British Medical Journal*[6] of patients who had suffered from rheumatism for a long period. All but one of these, according to the statement of relatives, improved in general health after tonsillectomy. There are many other reports of this kind.

Tonsils have been removed in the past in the presence of any unpleasant symptom of systemic disease on the theory that they might be connected with it. The tonsil for a long time held the position of a prisoner under lynch law, guilty unless his innocence could be demonstrated beyond a doubt. Or he was like the accused witch, who was thrown into the water because if she drowned her innocence could be established. These organs should revert to the position of the ordinary prosecuted member of society, innocent in the eyes of the law until conclusive evidence against him is presented. New criteria for the conviction of the pathological tonsil are sorely needed.

From the extensive opportunity for observation of tonsillectomized patients which the past two decades have offered, it becomes evident that wholesale and perhaps indiscriminate operations upon the tonsils of a large part of the population have at least done no harm. The general health of the population has not been impaired by them.

5. Rhoads, P. S.; and Dick, G. F.: Efficacy of Tonsillectomy for Removal of Focal Infection. J.A.M.A., 91:1149, 1928.

6. Leathart, P. W.: Tonsillectomy and Rheumatism. Brit. Med. Jour., 3666, p. 627, April 11, 1931.

RESISTANCE TO TYPHUS

Aside from the immediate pain of the bite, the sting of an insect has many other dangers. Malaria, yellow fever, sleeping sickness, typhus, Leishmania and dengue are among the diseases with which human beings may be inoculated by insects. Animals and plants as well as humans are susceptible to insect borne infections; raspberries contract infectious diseases from plant lice; cattle, it is known, from ticks.

One of the insect borne diseases which usually increases in war time and which is frequently fatal is typhus fever. There is no preventive inoculation nor specific treatment for it. It is thought to be rare in times of peace, and, if seen, is seldom identified. There is some evidence, however, that a mild form of the disease is endemic in the southeastern United States.

Typhus is studied with considerable difficulty, because the average rat or guinea pig is not very susceptible to it. He may have a brief febrile reaction to injection of the virus, but he resists its spread in his body, and it is usually difficult to recover the Rickettsiae bodies in any quantity from his tissues. Neither does the virus multiply on ordinary culture media. The technic of maintaining a supply of typhus virus is therefore difficult for routine use.

Zinsser[2] and coworkers at Harvard attempted to ascertain whether animals fed on a vitamin-deficient diet would be more susceptible, and hence better subjects for maintenance of an active virus. It is generally held that such measures as chilling or underfeeding reduce the resistance of an animal, but much of the evidence to that effect is non-specific or poorly controlled.

Zinsser's animals received a deficient ration until symptoms appeared, following which they were inoculated with a virus to which they had previously been quite resistant. In many animals a severe infection resulted, and the experimentors were able to obtain a concentration of the organisms from the animals almost equal to cultural proportions. The peritoneal exudate was rich in Rickettsiae, many of which were extracellular. Thus, on an inadequate ration the normal picture of resistance was completely reversed, obstacles to the distribution of the virus were broken down, and the microorganisms mul-

1. Maxcy: Public Health Reports, 41:1213, 1926. Quoted by Jordan, General Bacteriology, Ninth Ed. Philadelphia: W. B. Saunders Co., 1928.

2. Zinsser, Hans; Casteneda, M. R.; and Seastoni, C. V., Jr.: Studies on Typhus Fever. Jour. Exper. Med., 53:333, March 1931.

tiplied freely. They could be obtained in large quantities for immunological studies.

This method gives an improvement in the technic of study of the typhus organism and also adds to the information as to its general effects upon animals in poor condition. The authors conclude that resistance to typhus virus is closely related to the food intake and suggest that their studies explain the historical association of high typhus mortality with war and famine.

One may be inclined to extend the conclusions, although the extremely conservative authors forbear to do so, and to feel that probably any bacterial disease has a more rapidly fatal course in animals or men on any of the known deficient diets. This is not a corollary. It is quite possible that certain microorganisms, like their host, must have a continuous fresh supply of nutritive material from the host's dietary, and that lack of vitamin A, for example, from the host ration, might retard their growth. It is conceivable that some infectious or parasitic diseases might be benefited temporarily by withholding a vitamin.

The economic conditions of the current year offer a fertile field for increase of virulence of such diseases as typhus and for rapid spread of the infection.

SUPRARENAL EXTRACT

The suprarenal glands are notoriously necessary to life. Death is perhaps prompter following their removal than following the extirpation of any other endocrine organ, although for years the only definite substance with constant biologic effects which could be extracted from them was suprarenalin, from the medulla, or central portion. Suprarenalin increases the blood sugar, raises the blood pressure, is valuable in combating shock, but does not prolong the life of a suprarenalectomized animal. The cortex is the part essential to life, and it has been reported by several groups of workers within the last two years that from it an extract may be obtained which will prolong the life of adrenalectomized animals, and which is effective in the treatment of Addison's disease.[1] [2] [3]

Animals from which both suprarenals have been removed are extremely susceptible to colds and infections, or to any bacterial intoxication. Young rats which are suprarenalectomized and subsequently injected with a comparatively small dose of typhoid vaccine, that is, with killed bacteria, die very promptly. If an active suprarenal extract is given, they are said to survive indefinitely.[4] This fact has been proposed as the basis for testing the potency of an extract, to be substituted for the more constantly used test of survival of suprarenalectomized animals. The specificity of the test may be questioned.

Cannon and his coworkers, in 1924, noted that medulli-adrenalectomized animals were peculiarly susceptible to insulin injections. They responded with convulsive seizures to much smaller doses of insulin than those which affect normal animals. Suprarenalin reputedly mobilizes sugar from the liver in time of stress, and presumably the sensitization of their animals was dependent upon the absence of suprarenalin. It was caused by a medullary, not a cortical deficiency, since the suprarenal cortex of their animals was not disturbed. The reaction of Hartman's suprarenalectomized rats to typhoid vaccine need not be wholly dependent upon cortical deficiency. It may be related to the disturbance in sugar equilibrium as well.

There are many other conditions which lower resistance. Thyroidectomized and pancreatectomized animals likewise resist infection very poorly. It is widely known among clinicians with experience in diabetes that infection is the diabetic's greatest danger. A minor respiratory infection or a small boil may be rapidly fatal in this disease. The field of immunology must still include the whole field of physiology. There is no present evidence of its narrowing to one endocrine.

The work upon the cortical extract is still in a state of flux. There is much disagreement among the different groups of workers as to the method of obtaining it. Apparently none of the competing groups recognizes the activity of the extract which the other group has described. Each still requires confirmation by a friendly enemy. Where there is much smoke some fire must be, although a few physiologists still question whether an active cortical extract has been

1. Swingle, W. W.; and Pfiffner, J. J.: Studies on the Adrenal Cortex. Amer. Jour. Physiol., 96:153, Jan. 1931.

2. Hartman, F. A.; Brownell, K. A.; and Hartman, W. E.: A Further Study of the Hormone of the Adrenal Cortex. Amer. Jour. Physiol., 95:670, Dec. 1930.

3. Stewart, G. N.; and Rogoff, J. M.: Adrenal Insufficiency. Amer. Jour. Physiol., 85:404, 1928.

4. Hartman, F. A.; and Scott, W. J. M.: Protection of Adrenalectomized Rats Against Bacterial Intoxication. Proc. Soc. Exp. Biol. and Med., 28:478, Feb. 1931.

5. Cannon, W. B.; McIver, M. A.; and Bliss, S. W.: Sympathetic and Adrenal Mechanism for Mobilizing Sugar in Hypoglycemia. Amer. Jour. Physiol., 69:46, 1924.

obtained by any of the claimants in this field. Judgment upon the effectivity of the extracts must be withheld a little longer. Meantime, variations in the method of testing the extracts should not enter to confuse the literature.

Book Reviews

General Surgery. By Evarts A. Graham, A.B., M.D., Professor of Surgery, Washington University School of Medicine; Surgeon-in-Chief of the Barnes Hospital and of the Children's Hospital, St. Louis. 848 pages with illustrations. Chicago: The Year Book Publishers, 1931. Cloth, $3.00.

Anesthesia and analgesia during the past year have seen the addition of a great many new agents. Most of these are of the hypnotic type, as the barbitals. These are mainly adjuncts. In spite of these, ether still ranks as the safest anesthetic in the hands of all operators.

Surgical endothermy, which offered great promise last year, still seems to be in the experimental stage, the results not quite coming up to expectations. Thiocresol appears to give promise as a stimulator of wound healing.

Sympathectomy in Reynaud's disease is still a mooted question, a large number of papers appearing in the literature. In certain quarters the splinting of varicose veins is being tried.

The incidence of gas gangrene in compound fractures is about 19 per cent in Grady Hospital cases, according to F. K. Boland. In some cases of delayed union a chalk and silica compound has been tried.

There are a number of reports of the findings of osseous masses in old laparotomy scars and also of various foreign bodies in both the stomach and abdomen. The practice of using free omental grafts has been experimentally investigated by F. A. Rathe.

The mortality following operation upon the vermiform appendix, in spite of advances in surgery, continues to increase. It was 30 per cent in this country during the last two decades and in England has not diminished. This certainly is not a record to be proud of.

The section on orthopedics and fractures gives a number of modifications in technic and apparatus.

The text should be easier to follow if the italic heading of each abstract were in a bolder face type.

Pocket Cyclopedia of Nursing. By R. J. E. Scott, M.A., B.C.L. Third Edition, Completely Revised and Reset. 723 pages. The Macmillan Co. Leatherette, $2.90.

This is a small pocket size reference book covering the practical aspect of nursing. A complete system of cross references gives quick access to the wanted facts. Special attention has been given to the parts on materia medica in this edition. It is a very desirable little book for the nurse.

Aids to Bacteriology. By William Partridge, F.I.C., Joint Public Analyst for the County of Dorset and the Boroughs of Poole and Penzance. Fifth Edition. 311 pages. New York: William Wood & Co., 1931. Cloth, $1.75.

The fifth edition brings this compend up to date. Many new diseases as tuaremia, meliodosis, canine gastroenteritis, fright disease, "yellows," contagious gastroenteritis in cats, fowl typhoid, bacillary white diarrhea, limber neck, blackhead, avian coccidiosis, forage poisoning, Newcastle poisoning and *B. Salmonicidia* infections are included.

Following the trend of a single nomenclature, that of the Society of American Bacteriologists is introduced in the text. The large field which this small book covers makes it valuable from the standpoint of completeness alone.

An Introduction to Pharmacology and Therapeutics. By J. A. Gunn, M.D., D.Sc. (Edin.); M.A. (Oxon.); Professor of Pharmacology in the University of Oxford and Fellow of Balliol College; Sometime Examiner in the Universities of Belfast, Bristol, Cambridge, Cardiff, Edinburgh, Leeds, Liverpool, London, Oxford, Sheffield, and to the Royal College of Physicians. Second Edition. 233 pages. New York: The Oxford University Press, 1931. Cloth, $1.50.

The author by selection of the more often used drugs has made available a small book covering the minimum knowledge in this field. In this edition more thought has been given to practical therapeutics and a new chapter on drugs that act on the respiratory system has been added. These changes greatly improve the text.

Pediatrics. By Isaac A. Abt, M.D., Professor of Pediatrics, Northwestern University Medical School; Attending Physician St. Luke's Hospital, Chicago, Children's Department. With the Collaboration of Arthur F. Abt, M.D., Assistant in Pediatrics, Northwestern University Medical School; Assistant Attending Physician, St. Luke's Hospital, Chicago. 451 pages with illustrations. Chicago: The Year Book Publishers, 1931. Cloth, $2.25.

It is well known that pellagra is a deficiency disease, but not that it is seen at times in children. W. Lengsfeld reports this condition in a girl two years of age. E. D. Anderson stresses the point. "It is always true that in babies having the mildest head cold, the intestinal tract is upset in some way." He elaborates the different symptoms that may be present.

Appendicitis in children is probably one of the most masked of conditions, and one is often in a quandary in attempting to diagnose it. L. F. Meyer discusses this infection. At the same time there is a report of Ascaridiasis simulating appendicitis.

Max Zarfel reports a case of congenital tuberculosis. Pearl Zeek has a paper on juvenile arteriosclerosis. Under the heading of genito-urinary diseases, pyelitis as a cause of unexplained fever is stressed. The routine urinalysis is a necessity, especially in girl babies.

The specialty of pediatrics is about a quarter of a century old. Since its inception great strides have been made in the treatment of childhood diseases. The literature in this book reflects the alertness of the profession.

The Inborn Factors in Disease. By Archibald E. Garrod, K.C.M.G., D.M., LL.D., F.R.C.P., F.R.S., Consulting Physician to St. Bartholomew's Hospital and to the Hospital for Sick Children; sometime Regius Professor of Medicine in the University of Oxford. 160 pages. New York: Oxford University Press, 1931. Cloth, $2.75.

Garrod, in this brochure, presents the subject of diathesis in a short, delightful essay. The prologue gives the different concepts of heredity as taught by the various schools in England and on the continent. The text is then divided in two parts, the first considering predisposition as related to health, evolution, inheritance and the individual: the second as to structure and form, tissue defects, metabolism, inborn factors and idiosyncrasies.

The epilogue states that "in every malady there are two sets of factors at work in the formation of the morbid picture, internal or constitutional factors, * * * and the external ones which fire the train."

An Introduction to Practical Bacteriology. A Guide to Bacteriological Laboratory Work. By T. J. Mackie, M.D., D.P.H., Professor of Bacteriology, University of Edinburgh, and J. E. McCartney, M.D., D.Sc., Director of Research and Pathological Services, late Metropolitan Asylums Board, London. Third Edition. 421 pages with tables and illustrations. New York: William Wood & Co., 1931. Cloth, $3.50.

This text follows the compend style. The first half of the book is devoted to a study of bacteria in general, staining methods, animal inoculation and immunology as related to bacteriology. The last portion gives a practical description of the different organisms and specific methods of diagnosis. The text is compact and fulfills its purpose of providing guidance in the laboratory for the student.

Southern Medical News

ALABAMA

The Alabama State Medical Association met in Birmingham in April, at which time Dr. Toulmin Gaines, Mobile, was elected President, and Dr. Douglas L. Cannon, Montgomery, reelected Secretary. Dr. D. T. McCall, Mobile, and Dr. Jas. S. McLester, Birmingham, were reelected to the Board of Censors. Dr. Olin West, Secretary and General Manager of the American Medical Association, addressed the Association at a public meeting.

Butler County has a County Health Unit, which was recently organized.

Dr. James L. L. Bibb, Chattanooga, Tennessee, was a speaker at a recent meeting of the Jackson County Medical Society.

Dr. Arthur W. Rails, Gadsden, addressed the Madison County Medical Society at a recent meeting.

Dr. Arno B. Luckhardt, University of Chicago, the discoverer of ethylene anesthesia, gave a series of lectures at the University of Alabama School of Medicine under the auspices of the Gorgas Medical Society. Dr. Luckhardt was made an honorary Fellow in the Gorgas Medical Society.

Deaths

Dr. William Henry Minchener, Troy, aged 50, died March 27 of pneumonia.

Dr. James Wallace Rutherford, Franklin, aged 63, died April 14 of angina pectoris.

Dr. Robert James Redden, Sulligent, aged 82, died March 13 of cerebral hemorrhage.

Dr. Joseph Schwarz, Mobile and Spring Hill, aged 52, died March 13 of heart disease.

Dr. Robert Charles Macy, Atmore, aged 66, died April 5 of pneumonia and heart disease.

Dr. Russell Eugene Neff, Dothan, aged 32, died April 17 of peritonitis.

ARKANSAS

The Arkansas State Medical Society held its annual meeting in Texarkana April 23, at which time Dr. D. A. Rhinehart, Little Rock, was elected President; Dr. W. H. Mock, Prairie Grove, President-Elect; Dr. L. J. Kosminsky, Texarkana, Dr. W. A. Snodgrass, Little Rock, and Dr. A. Isom, Dumas, Vice-Presidents; Dr. William R. Bathurst, Little Rock, reelected Secretary; and Dr. M. J. Kilbury, Little Rock, Treasurer.

Dr. Arthur Paul Wakefield, Boston, was a speaker at a recent meeting of the Pulaski County Medical Society.

Dr. William D. Mims, Memphis, spoke to the Pulaski County Medical Society at a recent meeting.

Dr. and Mrs. Paul Mahoney and Dr. Dewell Gann, Jr., Little Rock, are attending clinics in Vienna.

Arkansas has added five new county health units, consisting of five full-time county medical directors and thirty-one public health nurses.

Dr. Conley H. Sanford, Memphis, and Dr. John A. McIntosh, Jr., Memphis, addressed the Mississippi County Medical Society at a recent meeting.

Deaths

Dr. Martin C. Burnett, Wooster, aged 57, died November 30, 1930.

Dr. Luther Hayes Callen, Fayetteville, aged 52, died February 25.

Dr. John Simpson Cannon, West Fork, aged 75, died February 27.

Dr. Frank Lawrence Castleberry, Jonesboro, aged 56, died March 11.

Dr. Harry C. King, Fort Smith, aged 60, died March 11.

Dr. Daniel Edward Drennen, Hot Springs, aged 59, died February 3.

Dr. John H. Kinsworthy, Little Rock, aged 64, died April 4.

Dr. David Perry Proctor, Carlisle, aged 34, died February 13.

Dr. C. Fremont Ellis, Eureka Springs, aged 74, died March 10 of heart disease.

DISTRICT OF COLUMBIA

Dr. William Gerry Morgan, Washington, was a guest at the Georgia State Medical Association in Atlanta in May.

Deaths

Dr. John A. Foote, Washington, aged 56, died April 11 of heart disease.

Dr. George Roe Lockwood, Washington, aged 69, died March 2 of pneumonia.

Dr. George Martin Kober, Washington, aged 80, died April 24 of heart disease.

FLORIDA

The Florida State Medical Society held its annual meeting in Orlando May 11-13.

The St. Johns County Medical Society has elected Dr. J. M. Irwin, St. Augustine, President; Dr. A. C. Walkup, St. Augustine, Vice-President; Dr. Reddin Britt, Bunnell, Secretary; and Dr. S. A. Scruggs, St. Augustine, Treasurer.

Dr. Joseph Colt Bloodgood, Baltimore, was a speaker at a recent meeting of the Hillsborough County Medical Society.

Dr. John M. Dodson, Chicago, addressed the Marion County Medical Society at a recent meeting.

Dr. W. J. Mayo, Rochester, Minnesota, addressed the Pinellas County Medical Society at a recent meeting.

Dr. Thomas W. Murrell, Professor of Dermatology, Medical College of Virginia, addressed the Hillsborough County Medical Society at their annual dinner recently.

Dr. T. Z. Cason, Jacksonville, has been made a member of the Board of Governors of the American College of Physicians.

Dr. Louie Limbaugh, Jacksonville, has been made a Fellow of the American College of Physicians.

Deaths

Dr. Robert S. Lowry, Fort Lauderdale, died recently in Ohio.

Dr. Edward William Wright, St. Petersburg, aged 70, died March 9 of carcinoma of the liver.

Dr. Charles S. Lowry, Miami, aged 64, died March 28 of heart disease.

Dr. Joseph Arnold Mixon, Pensacola, aged 43, died March 9, when he fell down stairs.

GEORGIA

The Georgia State Medical Society held its annual meeting in Atlanta May 12-15. The out-of-state speakers on the program were Dr. James B. Herrick, Chicago, Dr. Charles M. Rosser, Dallas, and Dr. William Gerry Morgan, Washington.

Dr. Frank K. Boland, Atlanta, has presented Emory University Medical School with a portrait of the late Dr. Edward C. Davis, one of the organizers of the Emory Medical Unit with the American Expeditionary Forces in France.

The National League of Nursing Education met in Atlanta May 4-9.

Steve R. Johnston has resigned as Superintendent of the Grady Hospital, Atlanta, and Asmon Lewis has resigned as Assistant Superintendent.

The State Board of Health is promoting a health campaign by means of a health train, called the "Hygienian," carrying various health exhibits.

Dr. T. F. Abercrombie, State Commissioner of Health, made the announcement recently that the maternity death rate in Georgia is increasing. In 1929 there were 550 deaths, while in 1930 there were 658.

Members of the Cobb County Medical Society, in cooperation with the State Board of Health, held chest clinics in Marietta recently.

Dr. Louis C. Rouglin, Atlanta, has been elected to succeed Dr. E. C. Davis, Atlanta, deceased, as a member of the Board of Trustees of the Fulton County Medical Society.

Dr. H. J. Vaughn, Atlanta, has moved into new offices at 388 Boulevard, N. E.

Dr. William Simpson Elkin, Dr. Daniel C. Elkin and Dr. J. D. Martin, Jr., Atlanta, have moved into offices in the new Doctors Building.

Dr. T. C. Davison, Dr. Edgar Boling, Dr. Hal M. Davison and Dr. Mason I. Lowance, Atlanta, have moved into new offices in the W. W. Orr Doctors Building.

Dr. E. Bates Block, Atlanta, has his office in the new Doctors Building.

Dr. George W. Heriott, Jr., Savannah, and Miss Dell Adams were married April 16.

Deaths

Dr. Thomas L. Arnold, Kingston, aged 82, died March 3.

Dr. Augustus Wesley Wright, Rome, aged 81, died March 11.

Dr. William Torrance Jones, Atlanta, aged 61, died suddenly March 18.

Dr. William G. England, Cedartown, aged 88, died March 26.

Dr. Lester A. Mallicoat, Trion, aged 56, died December 2, 1930.

Major Brooks Dodson, Fort Benning, aged 43, died December 6, 1930, of duodenal ulcer.

Dr. William Virgil Nash, Atlanta, aged 40, died March 30 of staphylococcus bacteremia.

KENTUCKY

The Social Hygiene Association of the State Board of Health is bringing to Kentucky on a two months' visit Dr. Eugene L. Swann, of the Educational Division of the American Social Hygiene Association and member of the Board of Governors of the Boy Scouts of America. Dr. Swann will make talks before the leading educational institutions of the State.

The Kentucky Hospital Association met in Louisville May 4 and 5 under the supervision of Dr. John R. Wathen, Louisville.

The annual meeting of the Eye, Ear, Nose and Throat Section, which was to have met in Bowling Green May 13 and 14, was called off on account of the automobile accident which caused the death of Dr. R. C. Lynch, of New Orleans, and Dr. J. A. Stucky, of Lexington, on their way to attend the meeting.

Dr. James O. Nall, recently of Chicago, is now College Physician and Instructor in Hygiene at Murray State Teachers College, Murray. Dr. Nall succeeds Dr. Willoughby Park Richardson, resigned.

Kentucky physicians are planning a special train to join Tennessee physicians for the American Medical Association meeting in Philadelphia in June.

Dr. J. M. Ferguson is medical head of the new United States Veterans' Hospital which will open soon in Lexington.

Dr. Charles Robert Slater, Erlanger, was honored recently with a community meeting celebrating his seventy-fifth birthday and the fiftieth year of his practice of medicine.

Dr. Gordon F. McKim, Cincinnati, was the speaker at a recent meeting of the Campbell-Kenton County Medical Society.

Dr. Frank A. Simon, Louisville, has opened an office in the Francis Building.

Dr. David L. Hill, Louisville, has moved his offices to the Brown Building.

Dr. R. Hayes Davis and Dr. Hill have terminated their association. Dr. Davis has moved his office to the Heyburn Building.

Dr. Thomas J. Crice, Louisville, has opened offices in the Brown Building.

Dr. W. E. Gardner, Louisville, has removed his office to the Heyburn Building.

Deaths

Dr. J. A. Stucky, Lexington, aged 74, died in May as the result of an automobile accident.

Dr. John A. Sloan, Albany, aged 61, died March 20 of pneumonia.

Dr. W. G. D. Flannagan, Jamestown, aged 65, died February 11.

Dr. Frank O. Young, Lexington, aged 80, died March 29 of cerebral hemorrhage.

Dr. Thomas Clement Hill, Louisville, aged 30, died March 22 of pneumonia.

Dr. Harry Price Honaker, Bowling Green, aged 52, died March 24 of heart disease.

Dr. Joseph Watson Vicars, Pikeville, aged 62, died April 4 of cerebral hemorrhage.

Dr. Albert Stewart, Georgetown, aged 60, died April 2.

Dr. Daniel Allen Penick, Nicholasville, aged 58, died April 10 of pneumonia.

Dr. J. C. Sullivan, Wickliffe, aged 65, died March 16.

Dr. Elmer Northcutt, Lexington, aged 67, died February 26.

LOUISIANA

The Louisiana State Medical Society held its annual meeting in New Orleans in April, at which time Dr. S. C. Barrow, Shreveport, was elected President; Dr. Roy B. Harrison, New Orleans, President-Elect; Dr. D. I. Hirsch, Monroe, Dr. J. T. Nix, New Orleans, Dr. C. E. Hamilton, Lafayette, Vice-Presidents; and Dr. P. T. Talbot, New Orleans, reelected Secretary-Treasurer.

One hundred and forty-nine books were added to the library of the Orleans Parish Medical Society during March, according to the report of the Librarian. The Medical Library Association is making plans to entertain Medical Librarians from all parts of the country at a meeting in May.

The Woman's Auxiliary of the Louisiana State Medical Society held its meeting in New Orleans April 14-17, at which time Mrs. R. T. Lucas, Shreveport, was elected President-Elect; Mrs. Roy B. Harrison, New Orleans, Mrs. C. R. Gowen, Shreveport, Mrs. L. T. Baker, Shreveport, Mrs. Claude Baker, Minden, Vice-Presidents; Mrs. T. H. Watkins, Lake Charles, Recording Secretary; Mrs. W. R. Buffington, New Orleans, Treasurer; and Mrs. J. E. Walsworth, Monroe, Parliamentarian. Mrs. H. W. E. Walther, New Orleans, was installed as the incoming President.

Deaths

Dr. Robert Clyde Lynch, New Orleans, aged 58, died in May as the result of an automobile accident in Kentucky while he was on his way to address the meeting of the Eye, Ear, Nose and Throat specialists of the State.

Dr. Solan George Wilson, New Orleans, aged 53, died March 21 of chronic myocarditis.

Dr. Augustin J. Himel, New Orleans, aged 72, died April 9 in Touro Infirmary.

Dr. Leon Henry Jastremski, Houma, aged 65, died March 14 of heart disease.

Dr. Thomas F. Jones, Albany, aged 81, died January 30.

MARYLAND

Dr. Karl Freudenberg, University of Heidelberg, delivered the Charles E. Dohme memorial lectures at Johns Hopkins School of Hygiene and Public Health recently.

Dr. William H. Welch, Johns Hopkins University School of Medicine, and Dr. Hugh H. Young, of Johns Hopkins Hospital, have been appointed members of the Conference Board of the National Institute of Health. Dr. Welch has had conferred on him a medal by the Royal Sanitary Institute of London.

Dr. Thomas Addis, Stanford University Medical School, San Francisco, will deliver the William Sydney Thayer lecture this year at Johns Hopkins University School of Medicine.

Dr. Joseph W. Mountin, U. S. Public Health Service, has been requested by Dr. C. Hampson Jones, City Health Commissioner, to conduct a survey of the Baltimore City Health Department.

The annual Conference of Health Officers and Boards of Health of Maryland met in May at Baltimore.

Edna H. Howard, Assistant Superintendent of Hospitals, Cambridge, has accepted a position as Superintendent of the Lynchburg Hospital, Lynchburg, Virginia.

The Medical and Chirurgical Faculty of Maryland held its annual meeting in Baltimore in April, at which time Dr. Eldridge E. Wolff, Cambridge, was elected President; Dr. John T. King, Jr., Baltimore, Dr. William T. Hammond, Easton, and Dr. Lewis K. Woodward, Westminster, were elected Vice-Presidents; Dr. Walter Dent Wise, Baltimore, was elected Secretary; and Dr. Charles E. Brack, Baltimore, was reelected Treasurer.

Deaths

Dr. William Stevenson Baer, Baltimore, aged 58, died April 7 of cerebral hemorrhage.

Dr. Francis Eugene Jameson, Hughesville, aged 49, died March 5.

Dr. Randolph Hinson Downes, Templeville, aged 67, died February 12 of acute nephritis.

Dr. William S. Archer, Bel Air, aged 75, died April 2 of carcinoma of the liver.

Dr. Rodney B. Milliner, Annapolis, aged 44, died recently of cerebral hemorrhage.

MISSISSIPPI

The Mississippi State Hospital Association met with the State Medical Society at its annual session at Jackson in May.

Dr. E. H. Cary, Dallas, Texas, and Dr. J. B. Bullitt, University of North Carolina, were out-of-state speakers at the annual meeting of the State Medical Society.

At a recent meeting of the Northeast Mississippi Thirteen Counties Medical Society Dr. R. B. Caldwell, Baldwyn, advocated a plan for a community hospital for each county in the State, to be supported by an allocation of funds which are now used to support the five charity hospitals throughout the State. If accepted, it will be the first time such a plan has ever been tried out.

Dr. C. B. McCown has recently moved from Nettleton to Prairie.

Dr. Willard H. Parsons, Dr. George M. Street and Dr. Ewing F. Howard, all of Vicksburg, were speakers at a recent meeting of the Issaquena-Sharkey-Warren Counties Medical Society.

Dr. Lawrence J. Clark, Dr. Preston S. Herring, and Dr. Isaac C. Knox, all of Vicksburg, spoke recently at a joint meeting of the Issaquena-Sharkey-Warren Counties Medical Society and the Central Medical Society.

Dr. Edwin W. Mackey, Hattiesburg, addressed the South Mississippi Medical Society at a recent meeting.

Dr. C. E. Lehmberg, Columbus, County Health Officer of Lowndes County, is able to be out again after a recent illness.

Deaths

Dr. John A. Blair, Hattiesburg, aged 75, died in January.

MISSOURI

The annual session of the Missouri State Medical Society met at Joplin May 11-14, with headquarters at the Connor Hotel.

Livingston County Medical Society has elected the following officers for 1931: Dr. R. J. Brennan, Chillicothe, President; and Dr. Donald M. Dowell, Chillicothe, Secretary-Treasurer.

Mississippi County Medical Society has elected Dr. A. H. Marshall, Charleston, President; Dr. E. Charles Rolwing, Charleston, Vice-President; and Dr. William S. Love, Charleston, Secretary-Treasurer.

Newton County Medical Society has elected the following officers: Dr. J. R. Reynolds, Neosho, President; Dr. R. C. Lamson, Neosho, Vice-President; and Dr. J. A. Guthrie, Neosho, Secretary-Treasurer.

Ray County Medical Society has elected the following officers: Dr. L. D. Greene, Richmond, President; Dr. E. E. Gay, Richmond, Vice-President; and Dr. C. H. Reed, Hardin, Secretary-Treasurer.

Dr. Eugene A. Scharff, St. Louis, is the new Superintendent of the St. Louis County Hospital to open in May.

Dr. Walter C. G. Kirchner, St. Louis, has been made Medical Director of the St. Louis City Hospital.

Dr. John Albert Key has succeeded Dr. Leroy C. Abbott as Professor of Clinical Orthopedic Surgery in the Washington University School of Medicine, St. Louis.

The annual session of the Mid-West Hospital Association, including hospitals in Missouri, Kansas and Oklahoma, met in St. Louis in April.

Scott County Medical Society has elected the following officers: Dr. G. W. H. Presnell, Sikeston, reelected President; and Dr. U. P. Haw, Benton, reelected Secretary-Treasurer.

At a special meeting of the Chariton County Medical Society in Salisbury honor was paid to Dr. William B. Lucas, Mendon, aged 74, who has practiced 51 years; Dr. James D. McAdam, Prairie, aged 73, who has practiced 50 years; Dr. Charles D. Stratton, Rothville, aged 73, who has practiced 48 years; and Dr. August W. Zillman, Keytesville, aged 72, who has practiced 44 years.

There will be a meeting of the Missouri State Board of Health in June at the Washington University School of Medicine for the purpose of examining applicants for license to practice medicine in Missouri.

A convalescent home for crippled children has been made possible through the will of the late Mrs. Louis P. Blosser, in which she left her residence in Marshall and a fund of $500,000 for this purpose. This will be operated in connection with the Crippled Children's Service of the University of Missouri School of Medicine.

The Jackson County Medical Society were hosts at a Fathers' and Sons' Dinner in April.

A bronze bust of the late Dr. Charles Augustine Bernays, St. Louis surgeon, has been presented the Missouri Historical Society through the bequest of the late Miss Thekla Bernays, a sister of Dr. Bernays.

Dr. J. J. Drace has moved from Kennett to Springfield and has limited his practice to diseases of the eye, ear, nose and throat.

Dr. Sinclair Luton and Dr. James F. McFadden, both of St. Louis, were recent guests of the Union County Medical Society, Anna, Illinois.

Dr. L. O. Nickell, Moberly, was elected Mayor of that city recently.

Dr. Eugene A. Scharff and Miss Louise Gruber, both of St. Louis, were married in March.

Deaths

Dr. Pinckney French, St. Louis, aged 79, died March 4 of cerebral hemorrhage.

Dr. Charles T. Dusenbury, Monett, aged 70, died suddenly December 20, 1930.

Dr. George D. Dalgliesh, Osceola, aged 65, died January 8.

Dr. Walter Martin Cross, Kansas City, aged 53, died March 24.

Continued on page 34

Patient Types . . .

The Elderly Patient

It is often a task to keep an elderly patient in active service. Constipation may be the borderline between invalidism and good health. Cathartics are particularly harmful in such a case but Petrolagar and "Habit Time" will help the senile bowel to normal function.

Petrolagar is composed of 65% (by volume) mineral oil with the indigestible emulsifying agent, agar-agar.

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Gentlemen:—Send me copy of "HABIT TIME" (of bowel movement) and specimens of Petrolagar.

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There is no Substitute

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In a study of the relative antirachitic activity of irradiated ergosterol and cod liver oil, Hess, Weinstock and Rivkin*, in an extended series of observations, found "The action of two specific antirachitic agents (irradiated ergosterol and cod liver oil) is likewise not identical in relation to infantile rickets." They found that "six teaspoonfuls of cod liver oil brought about cure where 20 drops of irradiated ergosterol (supposed to be the equivalent of 10 teaspoonfuls of cod liver oil) failed to afford complete protection."

Barnes, Brady and James** also report that "cod liver oil in a dosage of 1400 rat units of vitamin D per day was a much more satisfactory antirachitic agent than was the irradiated ergosterol in the approximately equivalent rat unit dosage."

And then consider the importance of vitamin A as found in cod liver oil which has proved so valuable in stepping up resistance and promoting growth.

Therefore, there is no substitute as yet for cod liver oil and particularly cod liver oil made "the Patch way"—standardized for vitamin A and vitamin D potency and presented in an unusually palatable form.

*Hess, A. F., and Weinstock, M., and Rivkin, H.: Proc. Soc. Exper. Biol. and Med., 27:665, April, 1930.

**Barnes, D. J., Brady, M. J., and James, E. M., Amer. Jour. Diseases of Children, Vol. 39, No. 1, January, 1930, page 58.

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Gentlemen: Please send me a sample of Patch's Flavored Cod Liver Oil and literature.

Dr.....

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Continued from page 568

Dr. Clery Rutan Treat, Okarche, aged 54, died suddenly March 11.

Dr. Edward Christian Wittwer, Mountain Grove, aged 57, died February 12.

Dr. John Theodore Evans, Springfield, aged 63, died March 25 of heart disease.

Dr. Edward A. Million, St. Louis, aged 74, died March 6 of pneumonia.

Dr. Daniel C. Heely, St. Louis, aged 85, died February 22.

Dr. Fred M. Moss, Paris, aged 76, died March 4 of pneumonia.

Dr. Walter H. Pollman, St. Louis, aged 47, died March 2 of pneumonia.

Dr. Charles Franklin Mitchell, Windsor, aged 77, died March 7.

Dr. Henry Rudolf Feuerborn, St. Louis, aged 58, died in April after undergoing a lung operation.

Dr. Verbenia McMullen, St. Louis, aged 71, died January 21.

Dr. A. V. Barnes, St. Joseph, aged 86, died March 7.

NORTH CAROLINA

The North Carolina State Medical Society held its annual meeting at Durham April 20-22. Out-of-state speakers on the program were Dr. John B. Deaver and Dr. Pascal Brooke Bland, Philadelphia; Dr. Thomas R. Brown, Baltimore; Dr. Edgar A. Hines, Seneca, South Carolina; Dr. Walter Clarke, New York; and Dr. Morris Fishbein, Editor of the Journal of the American Medical Association, Chicago.

Dr. Julian M. Ruffin, Duke University, has been granted a month's leave of absence for the purpose of studying the organization of out-patient departments of other hospitals.

At the meeting of the State Medical Society in Durham, Dr. Claiborne T. Smith and Dr. William Bernard Kinlaw, Rocky Mount, were presented with the Moore County Medical Society Medal for having the best paper at the 1930 meeting.

Dr. William Picard Jacocks, formerly of North Carolina, is returning to the State after some time spent in medical service in India under the Rockefeller Foundation. It is reported that Dr. Jacocks has accepted an appointment as State Health Officer.

Dr. James Steven Brown, Jr., Hendersonville, and Mrs. Dorothy M. Lord were married March 3 in Singapore.

Dr. James M. Northington, Charlotte, and Miss Betty Clarke were married April 11.

Dr. Roy H. McDowell, Belmont, and Miss Katherine Bowers were married March 30.

Deaths

Dr. William James Moore, Ashboro, aged 65, died April 3.

Dr. William E. Warren, Williamstown, aged 61, died April 5 of pneumonia.

Dr. J. Emmett Sebrell, Charlotte, aged 69, died April 4.

OKLAHOMA

An intensive course in internal medicine was conducted recently at St. John's Hospital, Tulsa. Out-of-state speakers were Dr. John H. Musser, New Orleans; Dr. Charles A. Elliott, Chicago; Dr. William H. Olmstead, St. Louis; and Dr. Porter P. Vinson, Rochester, Minnesota.

The State Health Department is carrying on an immunization campaign against diphtheria in the drought-stricken area through emergency funds appropriated by the Federal Government.

Dr. Walter C. Alvarez, Rochester, Minnesota, was a speaker at a recent meeting of the Oklahoma County Medical Society.

Dr. W. C. Mitchener, Okmulgee, is in Vienna doing special work in diagnosis and obstetrics.

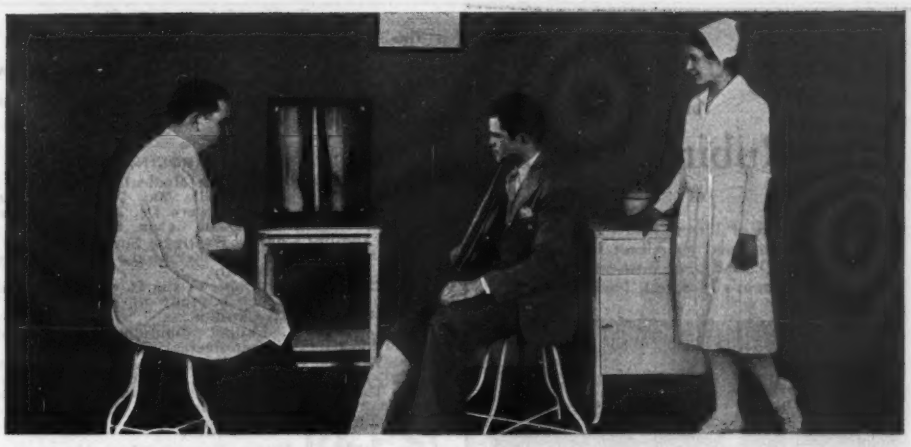
Deaths

Dr. Curtis R. Day, Oklahoma City, aged 65, died March 22.

Dr. W. T. Tilly, Muskogee, aged 66, died March 10.

Dr. William Griffin Blake, Tahlequah, aged 85, died February 13.

Continued on page 36



Radiographs Are Just As Important During Progress of Healing

ALL bone injury cases should be x-rayed irrespective of the degree of trauma. The examination should include radiographs before and after reduction of the fracture or dislocation . . . for complete protection of the patient and the physician a further x-ray check-up during the progress of healing is just as important.

Follow-up radiographs are the only means of determining whether callus formation is taking place in a normal manner. Certain systemic or diseased conditions have the effect of delaying callus formation; therefore, in all cases where the history indicates such a possibility, periodic radiography is most advisable.

The *unfailing uniformity* of Eastman *Diaphax* and *Ultra-Speed* X-ray Films is of utmost importance in a series of periodic radiographs made for comparison . . . identical detail and contrast in each are assured. Be sure all your radiographs are made on *dependably uniform* Eastman X-ray Film.

For a quarter hour of stimulating entertainment, tune in on "Devils, Drugs, and Doctors," broadcast each Sunday evening at 8 o'clock, New York time, over a coast-to-coast network of the Columbia System. These talks, sponsored by Eastman Kodak Company, are given by Dr. Howard W. Haggard, Associate Professor of Applied Physiology, Yale University.

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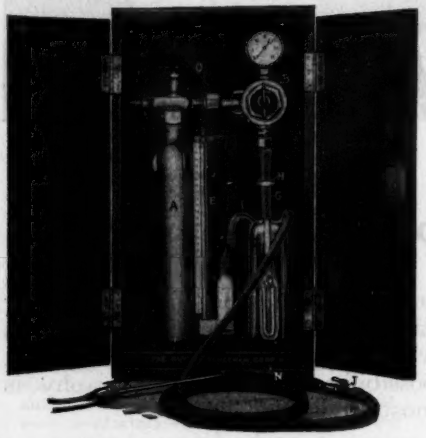
Insufflation of Uterus and Fallopian Tubes. Designed by Albert H. Aldridge, M.D., Adjunct Assistant Surgeon, Woman's Hospital, New York.



The Rubin method for the determination of tubal patency is a simple, safe diagnostic procedure.

The apparatus shown consists of a pressure tank (A) filled with carbon dioxide under high pressure (1,000 lbs.); a reducing valve (B) by means of which the head of pressure can be reduced from 1,000 lbs. in tank (A) to the desired safe level (ten pounds) as described below; a 40 cc. siphon flow meter (C) which is immersed in an especially designed one liter jar (D). The siphon flow meter is a device used to measure the volume of gas which passes into the abdomen. Before the examination is begun, the jar must be filled with tap water to a height of 4½ inches. As soon as the flow of gas has been started in the apparatus it will be seen passing through the siphon flow meter in regular excursions or pulsations. Forty cubic centimeters of gas pass into the abdomen with each excursion. About 240 cc. of gas are used during an examination. A mercury manometer (E). An intrauterine canula (F). A release valve (J) which is provided with cut off valve and also a side release vent.

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Continued from page 34

Dr. James F. Son, Ardmore, aged 68, died March 13 of cerebral hemorrhage.

Dr. Rodney A. Toms, Calera, aged 65, died January 14 of cerebral hemorrhage.

Dr. Benjamin Skinner, Pawhuska, aged 67, died February 19.

SOUTH CAROLINA

The South Carolina State Medical Society held its annual meeting at Greenville May 5-7. Out-of-state speakers on the program were Dr. John A. Kolmer, Philadelphia, and Dr. Dean Lewis, Baltimore.

Rear Admiral Charles E. Riggs, Surgeon-General of the U. S. Navy, was a speaker at the Medical Society of South Carolina recently.

Dr. Charles V. Akin, Jr., of the U. S. Public Health Service, is to conduct a study of pellagra and its prevention in South Carolina.

Dr. Leonard K. Philpot, Columbia, recently celebrated his fifty-sixth anniversary of practice.

Dr. William K. Fishburne, Moncks Corner, is the newly appointed Health Officer of Berkeley County.

Dr. Harold B. Webb, Nichols, and Miss Cornelia Gunter were married March 29.

Deaths

Dr. Benjamin Hiram Baggott, Columbia, aged 43, died April 14 of pneumonia.

Dr. Philip Henry Eve, Beech Island, aged 80, died March 18 of angina pectoris.

Dr. Douglas Haggard, McCormick, aged 54, died March 15.

Continued on page 38

Revelation In Stethoscopes

PILLING-MADE GORDON STETHOSCOPE With Soft Rubber Contact

DR. BURGESS GORDON
Jefferson Hospital, Philadelphia

A Stethoscope with a soft rubber ring provides a warm and yielding contact with the chest wall. Apart from increasing the comfort of the patient this construction tends to reduce the number of hair noises and extraneous sounds. The use of side rather than vertical tubes permits examination of the back without disturbing the position of the patient in bed.

It is comfortable even with children and emaciated adults because of its yielding contact which never chills, even on cold days. Diameter 1⅛ inch.

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MORE THAN a Pound of Cure!

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It's Safe, for when your baby patients are fed on DRYCO they are ready to withstand summer heat and its resultant drag on their resistance.

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DRYCO is easily and quickly prepared in all degrees of concentration. The baby can be fed under reduced volume with a very highly digestible food—one which contains protein that is 97 percent assimilable and which contains all the vitamins.

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Improved Apparatus

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Insufflation of Uterus and Fallopian Tubes. Designed by Albert H. Aldridge, M.D., Adjunct Assistant Surgeon, Woman's Hospital, New York.

The Rubin method for the determination of tubal patency is a simple, safe diagnostic procedure.

The apparatus shown consists of a pressure tank (A) filled with carbon dioxide under high pressure (1,000 lbs.); a reducing valve (B) by means of which the head of pressure can be reduced from 1,000 lbs. in tank (A) to the desired safe level (ten pounds) as described below; a 40 cc. siphon flow meter (C) which is immersed in an especially designed one liter jar (D). The siphon flow meter is a device used to measure the volume of gas which passes into the abdomen. Before the examination is begun, the jar must be filled with tap water to a height of 4½ inches. As soon as the flow of gas has been started in the apparatus it will be seen passing through the siphon flow meter in regular excursions or pulsations. Forty cubic centimeters of gas pass into the abdomen with each excursion. About 240 cc. of gas are used during an examination. A mercury manometer (E). An intrauterine canula (F). A release valve (J) which is provided with cut off valve and also a side release vent.

Kny-Scheerer Corporation

580 Fifth Avenue, New York, N. Y.

Continued from page 34

Dr. James F. Son, Ardmore, aged 68, died March 13 of cerebral hemorrhage.

Dr. Rodney A. Toms, Calera, aged 65, died January 14 of cerebral hemorrhage.

Dr. Benjamin Skinner, Pawhuska, aged 67, died February 19.

SOUTH CAROLINA

The South Carolina State Medical Society held its annual meeting at Greenville May 5-7. Out-of-state speakers on the program were Dr. John A. Kolmer, Philadelphia, and Dr. Dean Lewis, Baltimore.

Rear Admiral Charles E. Riggs, Surgeon-General of the U. S. Navy, was a speaker at the Medical Society of South Carolina recently.

Dr. Charles V. Akin, Jr., of the U. S. Public Health Service, is to conduct a study of pellagra and its prevention in South Carolina.

Dr. Leonard K. Philpot, Columbia, recently celebrated his fifty-sixth anniversary of practice.

Dr. William K. Fishburne, Moncks Corner, is the newly appointed Health Officer of Berkeley County.

Dr. Harold B. Webb, Nichols, and Miss Cornelia Gunter were married March 29.

Deaths

Dr. Benjamin Hiram Baggott, Columbia, aged 43, died April 14 of pneumonia.

Dr. Philip Henry Eve, Beech Island, aged 80, died March 18 of angina pectoris.

Dr. Douglas Haggard, McCormick, aged 54, died March 15.

Continued on page 38

Revelation In Stethoscopes

PILLING-MADE GORDON STETHOSCOPE
With Soft Rubber Contact

DR. BURGESS GORDON
Jefferson Hospital, Philadelphia

A Stethoscope with a soft rubber ring provides a warm and yielding contact with the chest wall. Apart from increasing the comfort of the patient this construction tends to reduce the number of hair noises and extraneous sounds. The use of side rather than vertical tubes permits examination of the back without disturbing the position of the patient in bed.

It is comfortable even with children and emaciated adults because of its yielding contact which never chills, even on cold days. Diameter 1⅛ inch.

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DRYCO

THE DRY MILK COMPANY, INC., Dept. SM, 205 East 42nd St., New York

Continued from page 36

Dr. William Anderson, Blacksburg, aged 83, died March 31.

Dr. Joseph Roddey Miller, Rock Hill, aged 63, died April 6.

Dr. John Gibson Edwards, Edgefield, aged 46, died February 4 of heart disease.

TENNESSEE

The Tennessee State Medical Society held its annual meeting in Knoxville April 13-16, at which time Dr. Robert Caldwell, Nashville, was elected President; Dr. William H. Reed, Kingsport, Dr. Thomas R. Ray, Shelbyville, and Dr. John W. Oursler, Humboldt, Vice-Presidents; Dr. John O. Manier, Nashville, was re-elected Treasurer; and Dr. Harrison H. Shoulders, Nashville, reelected Secretary.

The Knox County Medical Society is carrying on a campaign to encourage diphtheria immunization.

The four counties of Carroll, Henry, Weakley and Benton have recently organized a joint medical society.

Dr. Kirby S. Howlett, Franklin, recently had an anniversary celebrating fifty years of the practice of medicine.

The Knox County Medical Society at a recent meeting heard a Symposium on Asthma presented by Dr. Burton D. Haseltine, Dr. Alvin W. LaForge, Dr. John S. Ashby, all of Chicago; and Dr. Dear W. Myers, Ann Arbor, Michigan.

Dr. Bransford Lewis, St. Louis, recently addressed the Nashville Academy of Medicine.

Dr. William C. Sanford, Ripley, has succeeded Dr. Horace M. Roberson, Cleveland, as Director of the Bradley County Health Unit.

Dr. Hilton R. Carr, Memphis, has succeeded the late Dr. George B. Stewart as Superintendent of the Shelby County Hospital, Memphis.

Dr. W. B. Barton, Briceville, formerly of Cowan, recently was in Nashville visiting some of the hospitals and clinics.

Dr. Beulah M. Kittrell, Knoxville, has moved into offices in the Medical Building.

Dr. James R. Hamilton, Knoxville, has moved into offices in the Medical Arts Building, and has limited his practice to diseases of the eye, ear, nose and throat.

Dr. Jere Crook, Jackson, is at home from Baltimore after an illness.

Deaths

Dr. George W. Moody, Shelbyville, aged 84, died March 24.

Dr. J. F. Hill, Memphis, aged 71, died March 8.

Dr. Thomas P. Nowlin, Mount Pleasant, aged 78, died March 16 of myocarditis.

Dr. William E. Murrell, Winchester, aged 71, died March 5 of pneumonia.

Dr. George Wharton Moody, Shelbyville, aged 83, died March 24.

Dr. Jefferson F. Hill, Memphis, aged 70, died March 8.

TEXAS

The Texas State Medical Society held its annual meeting at Beaumont May 5-7, with headquarters at the Edson Hotel. Out-of-state speakers on the program were Dr. Clifford A. Barborka and Dr. William C. MacCarty, Rochester, Minnesota; Dr. Calvin C. Applewhite, Jackson, Mississippi; Dr. Frank N. Glenn, Boston; Dr. H. Wellington Yates, Detroit; Dr. Joseph C. Bloodgood, Baltimore; Dr. Tom B. Throckmorton, Des Moines; Dr. John R. Caulk, St. Louis; and Dr. James Q. Graves, Monroe, Louisiana.

Dr. Isaac A. Withers, Fort Worth, has succeeded Dr. Leopold H. Reeves as a member of the State Board of Medical Examiners.

Dr. John W. Balke, Rosenberg, has succeeded Dr. James C. Johnson, Richmond, as Health Officer of Fort Bend County.

Dr. Elva A. Wright, Houston, is the newly elected President of the Texas Tuberculosis Association.

Dr. Joseph D. Becton, Greenville, was appointed a member of the State Board of Medical Examiners when the number of members was increased to twelve.

Dr. John O. McReynolds, Dallas, is the newly installed President of the State Medical Society. Dr. John H. Foster, Houston, was elected President-Elect; Dr. Charles H. Harris, Fort Worth, Dr. Abb C. DeLong, San Angelo, and Dr. John W. Torbett, Marlin, were elected Vice-Presidents; and Dr. Holman Taylor, Fort Worth, was reelected Secretary

A public health nurse and a sanitary inspector have been sent to drouth-stricken areas to give immunization against disease, and in other ways to aid indigent families.

Miss Jessie Ericson has been made Superintendent of the new Medical Arts Hospital at Edinburg.

Continued on page 40

A characteristic of Mead's Powdered Lactic Acid Milk No. 1 (containing Dextri-Maltose) is the finely divided soft curd which never clogs the nipple. In a few moments, any mother can carry out the simple procedure required without error — a saving in time to her and an assurance to the physician that the feedings are correctly prepared. This product never curdles; it is always ready, and quickly reliquefied. No ice is necessary to keep the powder. It is convenient while traveling. Samples and literature on request. Mead Johnson & Company, Evansville, Indiana, U.S.A.

For Cases of Summer Diarrhea

Merrell-Soule
POWDERED
Protein Milk

DURING the hot summer months when diarrheas are severe and difficult, it is generally agreed that protein milk is the food of choice.

The unusual success of Merrell-Soule Powdered Protein milk in combating summer diarrheas and other intestinal disturbances of infants is attributed to a combination of the following factors, exclusive with this product:

1. Removal of whey salts.
2. High protein content.
3. Low milk sugar content.
4. Acidity of not less than pH-4.5.
5. Fine division and friability of the curd.

Its keeping qualities further recommend Merrell-Soule Protein milk. Moreover it mixes with water without separation of the curd and flows through the nipple as readily as whole milk dilutions.

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Recognizing the importance of scientific control, all contact with the laity is predicated on the policy that Merrell-Soule Powdered Protein Milk and its allied products be used in infant feeding only according to a physician's formula.

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Write for fees and directions.

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Continued from page 38

Deaths

Dr. Narra Wilford Goodloe, Cash, aged 81, died February 22 of pneumonia.

Dr. James Mathew Rivers, Turkey, aged 58, died March 6 as the result of an automobile accident last November.

Dr. Albert Byron Bishop, Iowa Park, aged 80, died February 26 of pneumonia.

Dr. John S. Neal, Carthage, aged 53, died January 17.

Dr. Chester Arthur Williams, Gruver, aged 46, died April 3.

Dr. M. B. Garrett, Gainesville, aged 88, died February 13.

Dr. James Terry Sanders, Dilley, aged 61, died suddenly March 11.

Dr. Thomas Lafayette Treadway, Brownfield, aged 71, died suddenly April 7.

VIRGINIA

An historic memento in the form of a framed and autographed letter written in 1879 by the late Dr. Charles Edward Brown-Sequard, member of the faculty of the Medical College of Virginia in the last century, has been presented to the Medical College by Dr. Joseph L. Miller, Thomas, West Virginia, who is an alumnus of the Institution.

Dr. Fred C. Zapffe visited the Medical College of Virginia recently as a representative of the Association of American Medical Colleges.

The Canti Cancer film on cancer control was shown recently at the Virginia Medical College through the courtesy of Dr. J. Shelton Horsley.

Dr. Carlisle S. Lentz has accepted the Superintendency of the University of Virginia Hospital, Charlottesville. He will be Professor of Hospital Administration in the School of Medicine.

The Medical College of Virginia will hold its ninety-third commencement exercises May 30 to June 2.

Dr. Morris Fishbein, Editor of the Journal of the

Continued on page 42

PURITAN MAID — TRADE MARK REG.

ANESTHETIC GASES and EQUIPMENT

Nitrous Oxide
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The results of twenty years' clinical experience in the foremost medical centers of this country, are your precedent for prescribing

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CYSTITIS

℞ 5 to 15cc, by injection direct into the bladder.

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Continued from page 40

American Medical Association, recently addressed the Norfolk County Medical Society.

Dr. James H. Culpepper, Norfolk, is the new Medical Director of the Norfolk Protestant Hospital.

Dr. J. S. Horsley, Jr., Richmond, has returned home after a stay of several weeks in Cuba.

Dr. and Mrs. Alexander G. Brown, Richmond, have returned home from a trip abroad.

Dr. D. Hunter Morrow, Boydton, has returned home from a visit to Daytona Beach.

Dr. W. Preston Burton has moved from Boissevain to Covington.

Dr. William M. Dick, Newport News, is the newly appointed Assistant Visiting Surgeon in the Ear, Nose and Throat service at Bellevue Hospital.

Dr. L. M. Abbott has moved from Parrott to New Castle.

Dr. Southgate Leigh, Norfolk, is the newly appointed Chairman of the Public Health Committee of the Virginia State Chamber of Commerce.

Dr. Charles W. Putney, Staunton, has gone to Europe to do post-graduate work in various noted clinics.

Dr. L. A. Law, Alberta, has just completed a new brick drug store in Alberta, which is being operated by J. A. Trent, Danville, a registered pharmacist.

Dr. Charles B. Martin and Miss Ruth Davis, both of Danville, were married April 4.

Dr. Donald Snead Daniel and Miss Josephine Townsend Moore, both of Richmond, were married April 18.

Dr. John Roland Ellison and Miss Julianne Butler, both of Suffolk, were married April 18.

Dr. Charles Linwood Savage, Sanatorium, and Miss Selma Repass were married in April.

Dr. Benjamin Franklin Phillips, graduate of the Medical College of Virginia in 1928, and Miss Julia Watson Sinclair were married in March.

Deaths

Dr. Andrew Fuller Horne, Glade Spring, aged 74, died March 3 of cerebral hemorrhage.

Continued on page 44

"STORM" The New "Type N" STORM Supporter

"Type N"

With long laced back and low extension upon hips: The reinforcing band attached in front at median line, also fastened in back. Hose supporters instead of thigh straps.

Takes Place of Corsets

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As loss of appetite and digestive disturbance usually accompany the disease, the unique usefulness of so remarkably digestible and appetizing a food is evident.

Samples Gladly Sent on Request

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Alkaline medication need not be unpleasant, need not upset the stomach, nor tend toward alkalosis.

KALAK WATER

offers an ideally balanced formula, which accomplishes alkalinization quickly and effectively and, at the same time, offers a carbonated, palatable drink which even the most fastidious patient can take and enjoy.

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SITUATION WANTED — Pediatrician, Harvard trained; general internship and four years' general practice before specializing; Southerner; married; age 32. Now engaged in practice and member of outpatient staff of leading children's hospital in East. Consider group practice; partnership; full-time position. Future must be bright. Prefer South Atlantic states. Reply B. L. J., care of Southern Medical Journal.

WANTED—An assistant physician for the staff of a New England State Hospital. Large admission rate. Separate medical and surgical service. Active research and teaching facilities. Two positions open. Available for graduates of class A schools, who have served a general internship and have had at least two years' psychiatric experience. Married or single. Liberal salary and full maintenance for family. Address: Dr. William A. Bryan, Superintendent, Worcester State Hospital, Worcester, Massachusetts.

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Continued from page 42

Dr. Robert Alston Martin, Jr., Petersburg, aged 67, died suddenly April 1.

Dr. Richard P. Thornton, Republic Grove, died March 26 after a lingering illness.

Dr. Peter B. Elliott, Blacksburg, aged 62, died February 15.

Dr. Ernest Ellwood Anderson, Crewe, aged 38, died April 21 of pneumonia.

WEST VIRGINIA

The State Medical Association of West Virginia held its annual meeting in Clarksburg May 19-21, with headquarters at the Stonewall Jackson Hotel. Out-of-state speakers on the program were Dr. William H. Mayer, Philadelphia; Dr. James E. Paullin, Jr., Atlanta; Dr. Grover C. Weil, Pittsburgh; Dr. Charles L. Scudder, Boston; Dr. Clarence H. Smith, New York; Dr. Waitman F. Zinn, Baltimore; Dr. Ray Blankinship, Madison, Wisconsin; Dr. Samuel McC. Hamill, Philadelphia; and Dr. W. G. Harrison, Birmingham, Ala.

Dr. Turner E. Cato, Greenville, succeeds Dr. James E. Fisher, New Cumberland, as Health Officer of Hancock County.

The Health Unit in Marshall County has been resumed after two years' suspension, and Dr. William G. C. Hill, Cameron, has been appointed Health Officer.

Dr. A. A. Shawkey, Charleston; Dr. A. H. Stevens, Everettville; and Dr. R. M. Wylie, Huntington, were inducted into membership of the American College of Physicians in Baltimore recently.

Following a precedent established last year, Charleston's five hospitals held their graduation exercises jointly in May.

Dr. W. S. Shepherd, Charleston, expects to sail in June for Europe to spend some time in study.

Dr. Virgil Holcombe, Charleston, who has been studying in Vienna for the past year, is returning home, and will relieve Dr. Shepherd at his office during his absence.

Dr. A. J. White has opened offices in the Medical Arts Building, Charleston, and will specialize in eye, ear, nose and throat work.

Dr. Ira C. Hicks, Huntington, has been ill with an infection of the ear and throat.

Deaths

Dr. William Thurlow Booher, Wellsburg, aged 50, died April 14.

Dr. Charles F. Hicks, Welch, aged 52, died April 10 of cancer.

Dr. Julius C. Shultz, Wellsburg, aged 51, died March 15 of cerebral hemorrhage.

Dr. Harry P. Campbell, Wheeling, aged 50, died suddenly March 15.

Dr. Everett R. Taylor, Morgantown, aged 47, died March 11.

Dr. Charles B. Sarver, Charleston, aged 70, died February 28.

Dr. John E. Musgrave, Handley, aged 72, died March 6.

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